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No. 166

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WEST EUROPE REPORT

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CONTENTS

FRENCH, U.S. FIRMS TO COOPERATE IN DEVELOPMENT OF COMPOSITES

Paris SEMAINE DE L'ENERGIE in French 19 Oct 83 p 8

[Article: "French-American Agreement for Development of Advanced Composite Materials"]

[Text] The French Petroleum Institute (IFP) and Aerospatiale (SNIAS: National Aerospace Manufacturing Company) recently signed an agreement with two American firms, Hercules Incorporated and Vetco Offshore Incorporated, a subsidiary of Combustion Engineering. This agreement, announced earlier in June by Aerospatiale and Vetco, covers the development of "advanced composites" structural components for use by the oil and natural gas industry.

IFP will contribute its know-how and experience in the design and operation of products and systems, its testing and petroleum industrial development facilities, plus its international sales organization.

Aerospatiale--through its Missiles and Ballistic Systems Division--will contribute its experience and know-how in the development and fabrication of high-performance composite materials, and also its expertise in using these materials for specific applications and products.

Hercules produces carbon fibers and will contribute, through its Aerospace Division, its know-how and experience in the design, development, and manufacture of composite structures for industrial applications.

Vetco will contribute its expertise and experience in the design and manufacture of equipment for the oil industry, as well as its sales force and international experience in marketing this type of equipment.

Another one of this partnership's objectives will be to define and conduct industrial development programs for the manufacture of new products tailored to different applications at sea and on land, applications for which weight-reduction, resistance to corrosion, and ease of design are in great demand.

During the past 3 years, IFP and Aerospatiale have successfully produced and systematically tested prototype tubes and pipes made of advanced composites for marine and land applications.

SNIAS-Aquitaine's management has indicated that this agreement" will result in establishment of a production plant" that will be the common subsidiary of all four companies. Although SNIAS-Aquitaine officials say they do not yet know exactly where this plant will be located, they are sure that in any case "it will be in France and border on the sea."

8041
CSO: 3698/96

FRENCH, SOVIETS DECIDE TO LAUNCH SIGMA SPACE TELESCOPE

Paris AFP SCIENCES in French 6 Oct 83 pp 11-12

[Article: "New Franco-Soviet Projects for Cooperation in Space"]

[Text] Space cooperation between France and the USSR is going well. A new big gamma-radiation astronomy project called Sigma has just been agreed upon at the meeting of the mixed commission in Cannes; the experiments along the route of Spectre, Sirene, Vega, etc., are under way; finally, the USSR is recommending that French investigators consider eventual participation in "prospective projects" exploring Venus and the Moon.

Contrary to its usual practice, no joint communique on the Cannes meeting has been published by the CNES but a briefing has been organized for the press on the site on 3 October with the participation of Mr Daniel Sacotte, manager of the CNES research programs, and Mrs Genevieve de Bouzy and Arlene Amar, responsible more particularly for the space physics and planetology sectors.

The "big item," the Sigma project (gamma imaging system with aleatory masking) has been agreed upon. It involves a high resolution space telescope mounted on a platform (converted Venus probe) before being placed in a very eccentric orbit (2,000 x 200,000 km) traversed in 4 days and inclined probably at an angle from 51 to 60° relative to the plane of the ecliptic.

The mission of Sigma will be to make a map of the heavens in the soft gamma range and in the hard X-ray range which will be much more exact than that obtained with the European satellite Cos-B, which has localized 20 gamma sources.

The Sigma launching is expected to be at the end of 1987 or the beginning of 1988. The total cost of the project according to the estimate of Mr Sacotte "if it is carried out within a purely national framework, being launched by Ariane would be somewhere between 400 and 450 million francs." In cooperation with the Soviets the French financial participation would be 80 million francs. However, this figure excludes all the research which has already been done in this domain in France. The Astrophysical Service of Saclay and the Toulouse Center of Space Radiation Studies will be the groups most involved in the Sigma project.

Among the experiments in progress, the Vega program (Venus-Halley) has reached a stage in which the flight models have been delivered. The first model is going to be delivered by Toulouse to the IKI in Moscow in next November-December; the second at the beginning of 1984 and the replacement around March of next year.

It is understood that the launching of the two probes will take place in December 1984 at intervals of a few days. Their arrival (the arrival of the part equipped with the camera built by the French) in proximity to the Halley comet is to be on 6 and 9 March 1986. (The European probe Giotto will graze the comet on 13 March.)

It is also known that France is furnishing 12 experiments within the framework of this project. Four are destined for the study of Venus and five for that of the Halley comet. French financial participation in Vega amounts to 100 million francs.

Other experiments are under way, for example, Spectre-2 for the study of gamma rays and X-rays on the satellite Gamma-1 which is to be launched in 1985. The satellite will be a Progress vehicle modified before being put into a circular orbit at 500-km altitude inclined at an angle of 51°. France is furnishing a scintillation chamber of 1.5 tons which is to be calibrated at the Krasnaya Pakhra acccelerator which is 40 km from Moscow.

An experiment called Sirene for studying X-rays which it was not possible to carry out on the Jean-Loup flight Chretien, is programmed for the middle of 1984 on board the Saliout station.

In that area of physics which involves solar-terrestrial relations a new project which should be put into effect very shortly, called Interbal, provides for the launching of two satellites--one in a polar orbit, the other in a very eccentric orbit designed to simultaneously study the magnetic environment of the Earth. Launching in 1987-1988?

Likewise in 1984 there should be a decision regarding the attachment of a meteoritic dust detector to the exterior of Saliout (it could collect dust coming from the Gioaccobini and Halley comets, for example).

Finally, with regard to the "prospective projects" French investigators have been invited to consider participation in two planetary missions and in two missions for terrestrial solar physics.

The Soviets are studying three possible scenarios for exploration of Venus, not before the nineties (atmosphere and especially the ground): either by means of a dirigible balloon which, like a Cartesian diver, would position itself successively in different locations on the surface after repeated ascents into the atmosphere or by means of a simple montgolfiere balloon or else by means of three small balloons simultaneously.

The IKI is also thinking of a launch into a polar orbit about the Moon, around 1987-1990, in order to study the lunar surface from an altitude of 100 km.

The French investigators are asked to consider two other projects in which they could suggest experiments to be placed on board. A project Aelita involving a submillimetric telescope intended for analysis of the distortion of a black body close to galaxies (study of galaxy masses) and for the study of the original 3-km radiation initiated by the "big bang."

It is apparent that there is no lack of projects in the near and distant future. A third of the scientific and technical potential involved in space research in France devotes, according to Mr Sacotte, the majority of their time to projects in cooperation with the Soviets.

8008
CSO: 3698/66

AUTOMOBILE INDUSTRY

BRIEFS

RENAULT SUBSIDIARY'S NEW PLANT--Toulouse, 6 Oct (AFP)--A new production unit of Renix Electronics, Inc, affiliate of Renault and Bendix which will employ 50 persons, was inaugurated on Wednesday in Boussens (Haute-Garonne) by Mr Richard-Albert Tillie, the company's chairman. This enterprise, which has its company seat in Toulouse where it employs 830 salaried personnel, specializes in the design and production of electronic systems for automobiles. According to Mr Tillie his company is "in full expansion, and in 1983 will do business amounting to close to 350 million francs and anticipates very shortly the creation in Midi-Pyrenees of other decentralized shops, of a factory equal in size to that in Toulouse and of an affiliate abroad." The capital (50 million francs) of Renix Electronics, Inc, is divided among the Renault management (51 percent) and the American group called Bendix-Allied Company (49 percent). [Text] [Paris AUTO INDUSTRIES in French 6 Oct 83 p 5] 8008

MERCEDES INCREASES CAPITAL--Stuttgart, 11 Oct (AFP)--The Administrative Council of the Mercedes Automobile Holding Company has decided to increase the capital of the company according to an announcement by the company on Tuesday in a communique published at Stuttgart. The volume of the company's capital is expected to be increased by DM 42,860,800 to total DM 428,576,000. The new stock offerings which will be offered to stockholders at the end of the year at the price of DM 50, the nominal stock of DM 50, will confer a dividend right beginning in the fiscal year 1983-1984. The Mercedes Automobile Holding Company has, it will be recalled, 25.23 percent of the capital of Daimler-Benz, which manufactures the Mercedes and which is the first-ranking automobile group in West Germany according to the business index. [Text] [Paris AUTO INDUSTRIES in French 12 Oct 83 p 7] 8008

CSO: 3698/66

BIOTECHNOLOGY

GERMAN COMPETITION FOR RESOURCES LIMITS PROGRESS

Hamburg DIE ZELT in German 14 Oct 83 p 26

[Article by Wolfgang Gehrmann: "The Fouls of Research Scientists"]

[Excerpts] The gentlemen were looking into the future and their prognosis was unfavorable: Genetic technology and new biological procedures, the nine professors concluded, are opening up undreamed-of possibilities. But when the state of research in the FRG is compared with achievements in other countries, it becomes apparent that the FRG is far behind.

For Heinz Riesenhuber, the minister of research who had asked the nine experts to investigate the quality of major biotechnological research, it was a confirmation of what he already knew: The FRG continues to lag behind in one of the technologies of the future.

The intimation that the FRG is not quite up to par must be depressing. After all, if it is true what the experts discovered, Bonn's support of biotechnological research has been of little consequence to date. To be sure, Volker Hauff--Riesenhuber's predecessor in office who, as a matter of fact, had a weakness for fast breeders and computer technology--asked two scientists on the federal payroll to investigate the secret of genes at two major research institutes--at a cost of more than DM 30 million per year. According to the jurors' verdict, the results were rather pitiful at the Society for Biotechnological Research (GBF) in Braunschweig and the Institute for Biotechnology (IBT) at the Juelich nuclear research facility.

According to the experts, there is "a great deal of difference in the quality of research and development work when it comes to the individual departments" of the GBF. Productive work groups are "definitely in the minority." A few groups are doing "good basic research, which, however" lacks "the desired scope for long-term applications." "Measured by international standards," the results of several groups are "rather below the average." At the IBT in Juelich, according to the experts, only two of the three divisions are doing impressive work. In their opinion, the project of the third division is "problematic."

The fact that government research scientists could be used as scapegoats for the poor start in Germany in biological research of the future must have been

very convenient for Bonn's investigators, because none of the experts is free of guilt when it comes to the backwardness of domestic research.

Four of the nine wise men, whenever they are not writing reports, hold positions as chairmen of German chemical and pharmaceutical concerns. If anybody in this country slept through genetic developments, it has to be industry. Five of the nine experts are instructors at German universities, which are to be held responsible for the lack of basic genetic-technological research and not government-supported research facilities.

A look at Bonn's research budget provides another reason why government scientists should be blamed less for the poor showing. Throughout the years, the amount of money that was allocated to research projects in industry, at universities and Max Planck Institutes was considerably higher than the amount that was budgeted for biotechnological institutes. For the current year and for next year, Bonn will provide DM 63 and DM 70 million for scientists involved in private and university research. During the past 10 years the minister for research spent DM 336 million for biotechnological projects--much of it was a complete waste.

To be sure, industry likes to cash in on Bonn's support again and again. But additional research is not at all mobilized through financial inducements by the state. According to a top manager of a leading German chemical concern in genetic technology, "it is almost a little unfair that we took this money from Bonn, because if we can afford it, we do it anyway, and we forget about those things that we cannot afford. The money we get from Bonn--one or two million--is of no significance for our research decisions."

One example that illustrates how little state aid helps in the battle of international competition when the industry itself is not up-to-date is the first marketable genetic-technologically created product: insulin, which is made of genetically altered bacteria.

To be sure, industrial research in this area cost Bonn quite a bit of money. Between 1975 and 1978, the Schering AG collected DM 2.5 million for a project in this area; the Hoechst AG received a subsidy of DM 2.3 million for the same purpose. But Schering abandoned the entire project at the end of 1978 because the board of directors felt that there was no chance of meeting the competition in the insulin market--among them, of course, was Hoechst. And Hoechst will not be able to market its bacteria insulin until 1984 at the earliest--2 years later than Eli Lilly, the U.S. competitor, which started to conquer the German market a long time ago.

The recipe for success of the U.S. genetic technology industry is the uncomplicated economic combination of highly qualified university scientists and capital investors. Professors and financiers who invest in risky projects--frequently they have connections to big industry--get together in small laboratories and transform basic knowledge into products. In the FRG all of these factors are practically nonexistent: risk capital, a sufficient number of top scientists and the unhampered cooperation between universities and industry.

It had been beyond the capabilities of the large research institutes in Braunschweig and Juelich to fulfill the task of assuming the function of "mediator between university institutes and business enterprises"--as formulated in 1980 in the "performance plan for biotechnology" when Hauff was minister for research. They would only have had a chance if industry itself had initiated and offered opportunities for cooperation. But not much was happening in that respect.

A scientist at the GBF in Braunschweig said: "Big industry is rarely to be found among our partners. At best, smaller firms--or foreigners--expressed a desire to cooperate with us." A member of the board of directors of a large pharmaceutical concern agreed when he presented his side: "There was no cooperation between us and GBF. Perhaps we were not aware of all the things they can do. It is possible that they undersold themselves."

Research managers in big industry were particularly disturbed about one thing when it came to government scientists, their excessive desire for codetermination. At the Company for Biotechnological Research--which had been organized as a GmbH [company with limited liability]--supervisory and advisory committees multiplied almost as fast as the microbes in the laboratories. Reviews and consultations took place between company representatives and the board of directors, management and the scientific-technical council, the scientific advisory council, department councils and the worker council.

The scientists in Braunschweig felt that they were practicing freedom of research; the council of experts, however, is now looking upon this practice as the source of all evil: "This structure makes it impossible to manage the company efficiently and prevents adequate quality control."

Minister for Research Heinz Riesenhuber is tackling the rewarding job of bringing the GBF up-to-date. It will be easy for him to follow the suggestion of the experts and cut through the jungle of departments. Furthermore, two industrial representatives are to join the 10-member board of directors.

Another proposal by the council of experts will be more of a headache for him. Accordingly, the size of the Juelich Institute for Biotechnology is to be reduced and it is to be incorporated into the Braunschweig GBF. In Braunschweig space is to be made available by abandoning all research on plant cell cultures. As a result, according to the experts, the planned construction of a new laboratory at a cost of DM 40 million will be superfluous for the time being.

But such reduction plans do not at all fit into Riesenhuber's concept, who wants to give priority to biotechnology when it comes to future research subsidies. If he is indeed convinced that the FRG needs a large biotechnical research facility, he will have to spend money more generously instead of coming up with little trickles. Above all, GBF scientists do not understand why their work on plant cell cultures is to be terminated--a research area which will be of great importance in the future.

On the other hand, one argument can be used against the great future of major research in Braunschweig. Four other German genetic research centers have been in the making for some time, and they can expect to receive the blessing of the minister for research. A big advantage is the fact that there is direct cooperation between university institutes and industry.

In Cologne, for instance, Bayer, the university and the Max Planck Institute for research on breeding are working together--until 1986 Bonn will provide more than DM 16 million for this project. In Heidelberg, the university and BASF [Baden Aniline and Soda Factory] are cooperating; Bonn will pay almost DM 19 million by 1985. In Munich, a work group composed of Bayer, Hoechst, the university and the Max Planck Institute are counting on funds from Bonn. And in Berlin, Schering cooperates with the university; the Berlin Senat subsidizes the project and also hopes for aid from Bonn.

As a result, there is no doubt that Riesenhuber, universities and industry want to be involved in the international race for the genetic business. It will not be easy for the major research scientists in Braunschweig to remain indispensable in the process.

8991
CSO: 3698/71

NORWEGIAN-FINANCED DATA RESEARCH CENTER OPENS IN CHINA

Oslo AFTENPOSTEN in Norwegian 5 Oct 83 p 15

[Article by Gunnar Filseth]

[Text] Peking, 4 October--The Chinese are entering the computer age--in part with the help of Norwegian technology. On Tuesday a Norwegian-financed data research center was opened in the Chinese capital.

The Peking Institute of Software Technology was financed by Norwegian funds, so far totaling about 10 million kroner. It has been called a pioneering project in more than one sense.

All technology in the Peking Institute comes from Norway. Norsk Data A/S produced the computer equipment and the computer center at the Trondheim University (Runit) developed a training course for the first few years. Computer instruction for Chinese students will follow about the same pattern used at the Norwegian Technical University (NTH) in Trondheim. It will be practically oriented, according to Runit research chief Prof Kristen Rekdal.

The Peking project is the first to be established according to a new United Nations financing plan for technological assistance projects. If a member nation agrees to finance a project, then that nation may produce and deliver all equipment involved in the project.

Ambassador Arne Arnesen, former NORAD (Norwegian Directorate for Development Aid) chief, and representatives of the Chinese government and the United Nations development program spoke at the dedication. The United Nations representatives praised Norway for its prompt and efficient handling of the project. The United Nations is involved in several assistance projects in China, but had no money available when the Chinese asked for assistance to construct a computer center for software technology, a sector that until now has been neglected. A request to Norway yielded immediate results. Parliament approved the project in December last year.

As a result, Norsk Data and Runit received the contracts with China, valued at 4 and 2 million kroner, respectively. The remaining 4 million kroner was applied to travel costs, United Nations administration, and for the purchase of graphics equipment that could not be obtained in Norway, it was said. The United Nations will request additional appropriations of 1.5 million for the first few years of operation.

For Norsk Data, the institute represents another success in its efforts to enter the Chinese market, where the need for computer technology and equipment will be extremely acute during the coming years.

Norsk Data signed its first contracts with China 2 years ago, when it delivered equipment worth 5 million kroner to China. Just last spring contracts totaling 700,000 kroner were signed for a United Nations project involving the maritime institute in Shanghai. Including the institute in Peking, contracts with China now total 10 million kroner.

Kristian Vennemoe, coordinator of Norsk Data's sales abroad, believes this is just the beginning. The Peking Institute could be a key that will open other doors in China. The Institute is under the direct administration of the state commission for research and technology, which has 400,000 researchers under its "umbrella."

Norsk Data is currently negotiating with numerous Chinese organizations. Vennemoe believes that, before the year is over, contracts valued at an additional 10 million kroner will be signed. At that time, Norsk Data will have signed contracts with China for 20 million kroner.

"I believe it is realistic to say that our involvement in China could increase by 50 to 100 percent annually," a representative of Norsk Data said.

Last week 40 Chinese computer students began their training at the Peking Institute. They were trained previously as engineers. Norwegian teachers will be responsible for six of the ten courses and lecture series during the first two academic years. Chinese teachers have already been in Trondheim to study the method of instruction used at NTH.

The United Nations will supervise the Peking Institute the first few years, after which it will be run entirely by the Chinese. The United Nations project leader is Anders Bjorgung of Norway, who is a member of the United Nations development program.

The United Nations now hopes to follow the same pattern used in Peking at the Asian Institute of Technology in Bangkok and hopes Norwegian funds will be available for this project, as well. This is a regional institute that provides advanced technological training for Asians from Pakistan in the west to Korea in the east.

This will be a much larger project than the one in Peking. The estimated cost is about 45 million kroner. "Plans for the project are complete and it is our hope that parliament will deal with the matter during the fall session," Bjorgung said.

Bjorgung was asked if it were a sound principle to give foreign aid under the expressed condition that this aid be used to purchase goods and services from

the donor country.

"This has become a more and more predominant principle among countries that grant international aid. It is reassuring to have the United Nations in the picture. The Bangkok institute will be a key project for computer training in Asia. I have no objections to this type of aid," Bjorgung said.

9336
CSO: 3698/61

JAPANESE, DOMESTIC ROBOTS INTRODUCED AT NORWEGIAN SHOW

Oslo AFTENPOSTEN in Norwegian 18 Oct 83 p 33

[Article by Ulf Peter Hellstrom]

[Excerpts] The Scandinavian countries are far advanced among the nations of the world as producers and users of industrial robots. This was stated by research chief Thorvald Vetlesen of the Central Institute of Industrial Research (SI) at the NorRobot 83 robot exhibition on Monday. He announced that a 20 to 30-percent increase in this market was expected this year.

At the exhibit itself, the Oslo company National Industri demonstrated for the first time the Japanese robots the Norwegian company will sell in Norway. Several small Norwegian companies that are just being established also attracted attention with their "Norwegian robots."

National Industri used NorRobot 83 to introduce a new series of Japanese robots the company will sell in Norway. Agreement has been reached with Dainichi Kiko, which is one of the largest developers and producers of robots in the world. This new agreement means that National Industri, which had total sales of about 500 million kroner in 1982, now is offering universal robots of various sizes ranging from small rapid-assembly robots to larger high-capacity models. The company hopes to gain a considerable share of the Norwegian robot market.

In addition to large, well-established companies such as Trallfa, Asea, NEBB-Con, and Norio, several small Norwegian companies have presented prototypes for the first time. They hope these robots will prove competitive. One example is Nor-Kyb, which was founded by civil engineer Petter Gran-Jansen and Christian Erlandsen.

"We have developed a robot that is not too exact in its movements. Its precision is only 0.2 mm. But it can be used for various purposes. Among other things, it will be used at Baker Hansen, where it will pick up loaves of bread from a conveyer and put them in a basket. When there is no bread on the conveyer, they can decorate cakes instead," said Gran-Jansen. He will now apply to the Industrial Fund and the Norwegian Scientific and Technical Research Council for funds to begin normal series production.

Gran-Jansen also has used his technical expertise in robot technology to produce a converted golf cart that follows him around on the golf course. That is certainly more convenient than dragging the cart over the course.

Multicraft A/S of Oslo presented its Assembler robot, which is specially designed for automatically assembling light components. Civil engineer Arne Austad said that series production would begin during the first quarter of next year.

9336
CSO: 3698/61

FRENCH FIRMS DEVELOP ARTIFICIAL INTELLIGENCE ROBOT

Paris ELECTRONIQUE ACTUALITES in French 21 Oct 83 p 22

[Article: "COMEX Develops Intelligent Robots for Underwater Construction Tasks"]

[Text] Yves Durand, general manager of COMEX Industries, outlined his company's robotics and remote-controlled operation programs at the 4-5 October seminar on "Extreme Environments" organized by CESTA (Center for Studies of Advanced Systems and Techniques). Durand said that the relation between diver and robot in underwater operations was a complementary one.

COMEX is currently experimenting with a remote-controlled robot whose electronics were developed by Matra. This robot will eventually be fitted with a manipulator arm and thus become the first lightweight vehicle capable of directly performing underwater tasks. For obvious reasons of simplicity and cost, the COMEX program will deal with items of equipment designed for very specific tasks.

Illustrative of this philosophy is the "Deep-Sea Repair" project conducted jointly with Elf, Total and ACB [Shops and Dockyards of Brittany]. This project covers the development of equipment designed to prepare the ends of underwater pipelines for welding. The major problem lies in the final phase. COMEX has developed a shape-recognition device capable of receiving an image of the sections to be welded. The robot will interpret that image and guide the welding torch accordingly. This is a second-generation robot capable of self-adaptation but whose development is plagued with unknowns.

Another COMEX project concerns a small-sized vehicle capable of observing, when completely untethered, and of maneuvering at a depth of more than 1,000 meters within cluttered and congested areas, indeed even inside submerged structures. Designated ELIT, this vehicle would be remotely controlled via an acoustic channel and be equipped with artificial intelligence. The remote-control system would enable it to send images to the surface and dialogue with its operator (navigator). Its artificial intelligence would permit it to control its own actions between two sets of orders received from the surface.

8041
CSO: 3698/96

SWISS FIRM BUILDS CASTING DIE FOR STEEL, CARBON, ALLOYS

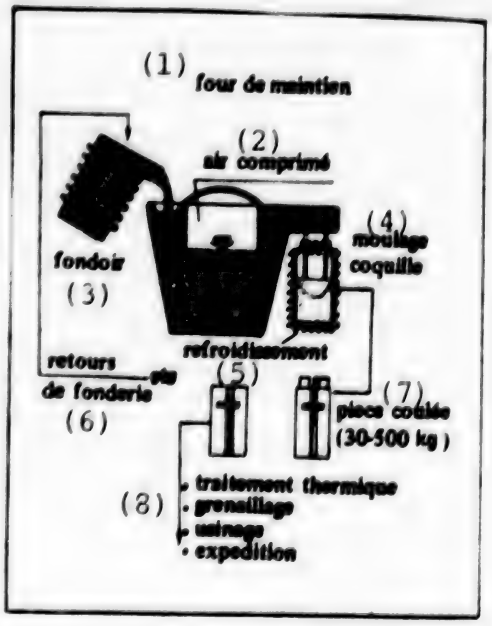
Paris INDUSTRIES ET TECHNIQUES in French 10 Apr 83 pp 123, 124

[Article by Lucien Martin: "Steel: Casting in a Permanent Die"]

[Text] The production of parts made of steel, carbon, or alloys by casting is generally done in sand molds. This procedure requires transport and preparation operations, and thus calls for blowing, crushing, and shaking equipment; in addition, a great deal of care must be taken in using this method. Quite often it is necessary to reheat large parts in order to prevent or limit the production of shrinkage cavities before cutting off the supply feed system. In addition, the sand gets incrusted in the cast parts, so they must be cleaned in order to prevent problems during later machining operations. The sizing of the parts is relatively imprecise, execution tolerances are too great, and reproducibility remains somewhat uncertain. Above all, in a conventional sand-casting foundry, because of falls and parts returned, a 55 percent output rate is considered normal. This means that in order to obtain 100 kilos of cast parts, it is a routine matter to consume 182 kilos of cast metal.

After testing and research, followed by industrial trials, the Georg Fischer company has developed a somewhat hybrid procedure of casting steel in a permanent die. The output rate achieved with this method is as high as 90 percent of the cast metal. The pollution caused by traditional methods is eliminated, and manufacturing costs are cut from 25 to 35 percent. A low pressure is applied in the liquid metal bath before injection in the die. This highly original procedure is suitable for casting steels containing up to 2 percent carbon or 25 percent chromium. The weight of the cast parts may range from 30 to 500 kilos. The lower limit is a factor of economic conditions, and the upper limit is determined by the possibility of sufficient power to close the dies on machines built now, as well as by the capacity of auxiliary furnaces used to maintain the steel in a molten state.

Depending on the weight of the casting to be done and the complexity of the forms involved, a casting operation may be executed in 6 to 13 minutes. This time includes the injection of the liquid metal, solidification, removal from the die, cleaning and inspection of the die and its preparation for the next casting. The average production is 300 tons of finished parts a year per operator. The major part of the savings produced by the use of this method, both in terms of work time and of energy consumption, result from the melting of the metal and the feeding of the die. Even for items whose casting weight is as high as 300 kilos, droppage and returns do not exceed 4.5 kilos. This is less than 6 percent of the total weight of the metal cast.



The first facility in Switzerland: 1,350 tons a year. (Georg Fischer documentation).

Key:

1. maintenance furnace
2. compressed air
3. smelter
4. die casting
5. cooling
6. foundry returns
7. cast item (30-500 kilos)
8. thermal treatment; shot blasting; machining; clearing

The dimensions of the parts cast, which are restricted to a length of 1,200 mm, a width of 800 mm, and a thickness of 400 mm, determine the applications. Thus, the products now being made by this method are most often parts made of steel alloys such as ASTM 532 IIC, which must resist wear, such as hammers of crushing equipment, rail switchpoints, shock rods, etc. The parts generally have shapes with straight lines. They may have inserts added or have space left aside for holes or slots. Generally speaking, the procedure can be used for the production of all parts within the range of dimensions and weight specified above, made of ferrous or nonferrous metals and their alloys. For considerations of an economic nature, the quantity of parts to be cast must exceed 200 a year.

A Totally Independent Unit

The facility has a 150 kVA furnace equipped with a casting drain channel for rapid removal of the liquid metal under low pressure, the casting machine, the control rack with its programming and control console, and the hydraulic unit. The die is filled directly from the maintenance furnace and the machine's programming eliminates practically all handling errors. The injection cycle is preset for each casting form. Depending on the weight of the items to be cast and the capacity of the main furnace, this furnace may be filled several times a day.

The equipment is designed so that it forms a totally independent unit. For this reason, it can be installed in any part of the foundry under the best conditions. Depending on needs and the design of the tools, it is possible to set up a complete casting line with a thermal treatment furnace to stabilize the parts. These parts may be annealed or stabilized directly without being cooled, upon removal from the die, after elimination of the casting feed and without any sand removal. Reheating before cutting off the supply feed system in order to avoid shrinkage cavities is not necessary, even for large parts. These possibilities, which are specific to this procedure, make it possible to save 400,000 kcal per ton of steel cast. The lowered casting costs are aided by the excellent duration of the permanent dies. At the end of their usage, the cost of the dies is 80 percent lower than the cost of those used in traditional sand-casting procedures. The low manufacturing cost is also a result of the precision of reproduction of the parts in both dimensions and weight, which may vary within proportions from 0.06 to 0.13 percent. This is not the case with sand casting. In terms of the environment, as neither sand nor binders are used, pollution of the atmosphere and of cooling water is eliminated.

The quality of the metallurgical structure of the items cast using this procedure is particularly good. As an example, a cast chromium steel has a structure containing very fine primary eutectic carbides uniformly distributed throughout the matrix. This dispersion helps to produce a very regular distribution of hardness throughout the entire cross section of the parts after thermal treatment. Vaporization of the cooling water circulating in the die takes place early in the process, during casting. This plays an important role in the formation of the structure at the start of solidification of the external part of the piece.

The first independent facility of this type is located in Schaffhausen, Switzerland. It is operational, using two work crews, each composed of two operators and one part-time specialist. The average annual production is 1,350 tons of finished parts, comprised of over 25 different models.

7679
CSO: 3698/53

AUTOMATED FOUNDRY IS QUIET, CLEAN, EFFICIENT

Paris INDUSTRIES & TECHNIQUES in French 1 May 83 pp 23-25

[Article by Philippe Ducourty: "De Dietrich, the Foundry as a Process."]

> [Text] From casting to shotting, all operations are automated. There is neither noise nor fumes.

A replica of Beaubourg? In any case, one thinks immediately of the latest and most remarkable of the great Parisian monuments when entering the new foundry in the De Dietrich group. The colossal "innards" of the ventilation ducts stand out and all the equipment is colored in red, green, blue... The floors are clean, the noise is not offensive. Too, there are very few people in this vast hall extended laterally by a long tunnel. It is to the latter that the foundry's most polluting and noisiest operation--stripping and shotting--have been consigned, so as to better trap the fumes and the decibels. Neither are there any unpleasant odors. The air is clean and clear, both inside and outside the plant. The picturesque site of the small thermal spa of Niederbronn does not suffer in any way from being close to the plant.

We must therefore state that the foundry is not what it was before. Nevertheless, the factory of De Dietrich, for 3 centuries a foundry in the east of France, is a perfect example of technological evolution: side by side on the same site one can see evidence of three ages: the manual floor (operation ceased), the first automated floor or BMD [expansion not known] still in operation ([thanks to] the little revolution of '68) and in the new hall, since last September, the Disamatic 2070 floor. This completely automated molding machine of Danish origin brings to the French leader of the cast-iron boiler market an additional production potential of 1,000 metric tons a month. Its vertical pour molding process into snap molds 70 centimeters high, 95 centimeters wide by 20 to 56 centimeters in thickness, depending on the piece to be produced, allows it to reach a production rate of 275 snap molds per hour. The eventual installation of the cores is done without loss of time. While a snap mold is pressed, another is automatically filled with molten cast iron under nitrogen pressure. The maximum dimension of the pieces produced on this floor is compatible with a great variety of the pieces, both solid and hollow. The numerous tests already carried out have demonstrated the great

dimensional accuracy of the molding. Progressive mastery of the quality of the mold sand and of the shotting parameters will allow the expected objective to be reached soon: a precision of the order of 1/10. "The pieces will then have very good surfaces and will require hardly any trimming," according to Michel Troester of the sales department. To reduce the economic difficulties of the heating industry and to utilize this new tool to full capacity, the foundry and the sales people have combined their efforts. "We are primarily looking for partners who want to produce gray cast iron FT20 pieces, a quality of casting which particularly suits the know-how of the plant," states Michel Troester.

Tests Carried Out Bring Out the High Dimensional Molding Accuracy

"By next September all sorts of parts should be supplied by the new molding floor," he says. "Supports for washing machine drums, valve bodies, gas burners, parts for the automotive industry, cooking pots, etc." One of the great trumps of this floor, says Serge Heraud, manager of the engineering department, is its flexibility: "One can change pattern plates immediately without interrupting production and thus adapt best to demand." To this advantage, the De Dietrich technicians have added another: their know-how in the area of manufacturing pattern plates. The unit cost of the latter, made of Araldite, is lower than that of steel and can be combined by halves or quarters, either to produce several identical pieces of small dimensions or to produce different pieces on the same stud. "At present," adds Serge Heraud, "we are engaged in optimizing these combinations."

The high floor capacity required installation of a 120 metric tons per hour sand moulding shop. Following recovery in the soundproof tunnel at the stripping station, the "used" sand is cleaned and rid of its metallic particles. It is transported by conveyer belt to the sand preparation plant where it is stored in hoppers (after cooling) before being regenerated. The "regeneration" is carried out by the addition of several components: siliceous sand, bentonite and ground coal. These ingredients are carefully weighed before entering an approximately 20 cycles per hour mixer with a capacity of 6 cubic meters. The rate of humidification of the mixture thus obtained is carefully controlled. A laboratory watches continuously over the quality of the mold sand and of the binders used, while a programmable robot, the TSX80 of Telemechanique, manages this complex process. In addition to this model sand moulding shop designed by Einich, a German company, the Niederbronn engineering service has also made use of the great length of the solidification zone for the pieces in the tunnel. This guarantees a time interval of 28 to 43 minutes before stripping, which eliminates any risk of quenching or of deformation of the pieces.

The struggle against pollution accounted for a large part of the total granted investment: nearly 20 percent of the 60 million francs committed. "The risks of plugging inherent in the dry route led us to adopt the solution of dust removal by the wet route," explains Serge Heraud, "After initial separation of the large particles by cyclones, several decantation and flocculation operations are carried out on the fine particles in the

purification plant; easily shoveled sludges are thus obtained." It was necessary to install complex ventilation equipment. In particular, it was necessary to build a 38-meter-high chimney, more than 2 meters in diameter. The total flow of air picked up is impressive: 170,000 cubic meters per hour.

Thirty-five Tons of Molten Cast Iron Maintained Day and Night, 365 Days a Year, In a Standby Furnace.

Some efforts which limit the discharge of dust into the atmosphere at a rate largely compatible with the authorized norm (100 grams per cubic meter) [incomplete sentence]. Having decided earlier on the selection of the "wet route" for dust removal from the two natural-draft cupola furnaces, it is planned to link up this installation with the new purification plant. At the outlet of the cupola furnaces an electric standby furnace maintains day and night, 365 days a year, 35 metric tons of molten cast iron. This assures the supply of the 200-kilowatt, 4-metric-ton-capacity main gate ladle which supplies the new floor and also supplies the oldest BMD floor. The latter, reserved for manufacture of hollow older medium-size parts for boilers, was considered scarcely 15 years ago as the "very latest" in the field of automation. It achieves the rate of 33 molds per hour... compared with 275 for the new floor. Its technology, however, remains remarkable because it assures the pouring into molds of 1,500 metric tons of molten cast iron per month. Its molding process is not based on vertical automatic casting but on horizontal casting which continues to require human intervention. Nine individuals work around the impressive circular molding ring. It is on this ring that the upper and the lower part of the mold are made in turn. After bellows cleaning of the pattern plate, little spirals of copper-coated iron (the "auger gimlets") are placed in position. They support the core when this is introduced between the two parts of the mold. After covering the pattern plate by a foundry flask, the sand is projected under pressure, which assures a packing stress on the impression side of 17 to 18 kilograms per square centimeter. The machine then proceeds to the delicate stripping operation. The lower mold is rotated by 180° on its axis, the upper half mold being placed in a vertical position. The placing into position of the core on the lower part, the control of the impression and the production of holes in the upper part to allow gases to escape during the pouring precede the closing of the mold. During this last operation and in order to avoid any untimely fallout of sand, the lower half mold moves aside while the upper remains in motion. For the DMB [as printed] floor as for the Disamatic, the molten cast iron is the subject of great care. The continuous control begins from the charging of the cupola furnaces. The chemical composition and the weight of the raw materials are carefully controlled. More than 40 percent of new cast iron makes up the final composition. At each tapping, samples are withdrawn to carry out mechanical and chemical tests. This is a veritable identity card made out for the material. The control of the equivalent carbon contained in the cast iron is particularly important. The course of the cooling curve serves to determine it. Very important as well are the flow characteristics of the molten cast iron. A test piece in the shape of the turn of a spiral permits gauging the flexibility of the material--a

quality which has earned this cast iron the designation of "De Dietrich special cast iron." Sufficiently flexible to resist thermal shock, it is this which has made possible the production of a cast-iron boiler with a pressurized furnace.

[Box] De Dietrich in a Nutshell

It is mainly to satisfy the requirments of its Thermal Equipment Division that De Dietrich built this new automated foundry which employs 400 people. Well known for its kitchen ranges, its recessed fixtures, and its heating equipment for all energy sources, the thermal division has enabled the company to achieve within 10 years a position as leader of the cast-iron heating market (more than 50 percent of the boiler market in 1982). Its turnover rose to 381 million francs in 1982. It is part of a group which today numbers more than 6,000 persons and which is active in three other areas: household, railroad and chemical equipment.

5586
CSO: 3698/42

NEW HEAD OF FRANCE'S THOMSON INSTITUTES REORGANIZATION

Paris L'USINE NOUVELLE in French 20 Oct 83 pp 91-92

[Article by Alain Pauche: "Gomez Attacks"]

> [Text] Isolated when he was appointed, Alain Gomez is extending his control over Thomson's management. He proceeded in two stages: he trimmed headquarter personnel, he adopted an organization by subsidiary and by market. His objective: to give punch to the group's men to face competition.

"It is in factories that economic wars are won, not at headquarters!" This quip of Alain Gomez soon after he was appointed head of Thomson is now taking an entirely different meaning. This week, the Thomson chief executive officer is putting the last touch to his plan for an overall reorganization of the group's structures! This remark, which had first been interpreted as a sign of frustration by the 1,800 salaried employees of Thomson's Paris headquarters--who are used to decoding messages from their chief executive officers--was in fact a statement of intention. Yet, in February, the appointment of Noel Goutard--formerly with Schlumberger and United Shippers--as manager of operations, a job created for him, was to cast a strong light on a very deep will for reform.

Noel Goutard immediately undertook to trim headquarter personnel; when he was through, only 300-400 people remained out of 1,800. This staff reduction does not boil down to a mere trimming of excess executive personnel, although on Boulevard Haussmann Noel Goutard is seen as a genuine "killer." The jobs abolished at headquarters will be transferred to subsidiaries. This is being done now and will continue for several more weeks.

After saying in all factories, through videocassettes, and writing to the 30,000 Thomson cadres that Thomson had "been dragging excessive overheads for too long," Alain Gomez soon started tackling the second item in his battle plan, the modification of an "overly complex legal and financial organization that makes it impossible to clearly assign responsibilities and to control them." This is what is going on today, as the Thomson chief executive officer is taking advantage of various leverage effects, the draft agreements with CGE [General Electric Company] in the past few weeks being the last touch to a campaign of explanation-mobilization, a high point of which was the announcement of the group's losses for 1982 (2.2 billion).

A Staff Reduced by Half

Following the advice of American counsels, especially Booz Allen, Alain Gomez thus trimmed headquarter personnel. He also reduced his own staff. Probably by half. From 20, it will go down to 10. In addition, he turned over the various operations to subsidiaries. Although the new organization is more advanced at Thomson-Brandt, the parent company, than at Thomson-CSF [General Radio Company], the subsidiary, yet the principle is the same. The objective is to decentralize operations, make people accountable and give them all the means they need, especially financial means.

Until now, Thomson was organized by functions and by products, and the dividing lines between the provinces of the functions, the subsidiaries and the divisions were rather blurred. Alain Gomez's objective is to establish a "true" organization by subsidiary and by products, the tasks being integrated according to the final results of the work done. Production, development and sales are reorganized around specific markets. This organization system has at least one advantage: it makes it possible to tie the responsibilities of the groups to the objectives of the enterprise, as it becomes possible to judge the groups according to growth or profit criteria.

The most important subsidiary will consist of the consumer goods branch of Thomson-Brandt, reinforced by Cepem (household appliances), and CGE. And Jacques Fayard, who is now in charge of the division, will head the enterprise whose sales should reach 18 billion francs (Thomson's overall sales amount to forty seven billion francs).

The other three Thomson-Brandt subsidiaries will manage respectively trade and collectivity operations (Bonnet, Satam, Dagard, etc.), copper operations (including Thomson-Jeumont-Cables which will be taken over by CGE) and arms manufacturing. In addition to these subsidiaries, Thomson-Lucas, a holding, will include Auxilec, Bronzavia, ABG Semca [expansion unknown] and Mi-Nie; it might be headed by Noel Goutard once his mission is completed. He would succeed Guy Brana, who is also vice-chairman of the CNPF [National Council of French employers] and chairman of the economic commission.

CSF Reorganization Easier

Engineering operations will not be turned over to subsidiaries. SODETEG [Technical Studies and General Enterprises Company] (2.5 billion's worth of order in 1982), the kingpin of this branch, and whose sales to Thomson represent only 10 percent of its total sales, would be sold to FRAMATOME [Franco-American Atomic Construction Company], which is now expanding its field of competence from nuclear engineering to plain engineering. As for SEDOC [European Industrial Documentation Company] (150 million francs in sales), it could merge with CGE. But, as in Monopoly, it is the fourth utility that is the most expensive!

At CSF, reorganization appears less advanced. Maybe because it is easier to implement. Three operations are involved: systems and detection (8.5 billion francs in sales), electronic components (4 billion), medical equipment (3.5

billion). As is known, the present communications branch (12.9 billion) should merge with CGE. The group is determined to turn these operations, like those of Thomson-Brandt, into responsible and independent profit-making centers.

Emergency Mobilization of Cadres for Profitability

Knowing he has the support of his shareholder, the state, Alain Gomez has decided to go ahead fast, although negotiations often take longer. Actually, in six months, the rules of the game have changed. The nationalized industrial groups are no longer considered and given priority as forces that could attract investments or advanced social laboratories. They were assigned a single mission by Laurent Fabius: to restore financial balance and make substantial profits by 1985.

The Thomson chief executive officer drew three conclusions from this: (1) it is urgent to mobilize the cadres around the key concept of profitability which had been somewhat forgotten by certain parts of the group that are sheltered from the market and from competition (for instance, telecommunications and arms); (2) it is no less urgent to refocus operations on three fields: consumer products, components, arms; medical equipment is the fourth pole, but also the major center of losses of the group after the great sharing-out with CGE; (3) it is necessary to organize subsidiaries so as to better identify needs, orient investments, and especially plead for financing with the authorities who are not inclined to support a "group lacking transparence, divided by clans subject to the influence of competing administrations, more concerned with protecting their territory than with cooperating," to quote the French manager of a powerful U.S. electronics company.

In reorganizing Thomson, the company's chief executive officer has another objective. He wants to protect the group as a whole from the influence of the Administration. By organizing subsidiaries, Alain Gomez is increasing his power and hopes to break detrimental habits resulting from the company's concubinage with successive administrations. Indeed, although the Thomson chief executive officer cannot remove influences where subsidies are allocated, he refuses to accept that subsidies remove the risk, the prime mover of change and profitability. When he got rid of the telecommunications branch, which was unable to say no to the PTT [Postal, Telecommunications and Television Administration], his intention was to start the group on a different road by making it aware of "the inefficiency of its structures resulting from the fact that it had guaranteed markets," to quote John Zysman, who closely studied relations between the state and leading French industries.

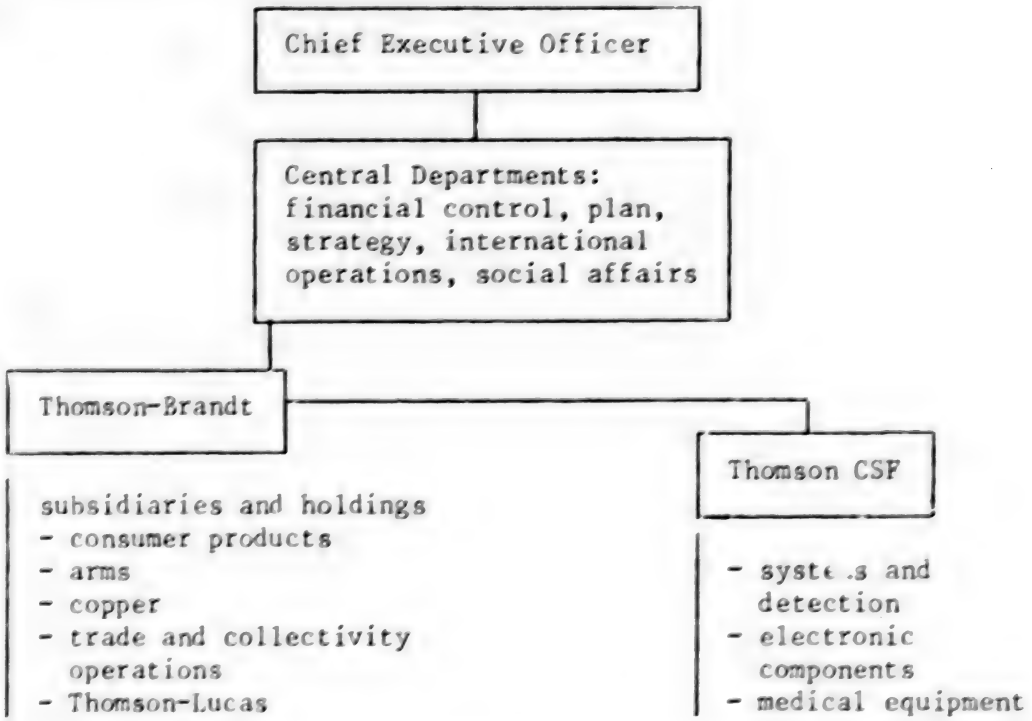
Fifteen years after Thomson-Brandt and CSF came together, the head of the nationalized Thomson group is therefore now implementing an organization whose ultimate purpose is to make the group competitive. And he does so to fulfill the mission ("Make profits!") given to him after several months of hesitations by a leftist government. This is... the October Revolution!

Defining a Medium-Range Strategy With New Men

Yet, we should beware of paradoxes. Alain Gomez has little room left to maneuver. Having shown that he has full control over his group and over his men, he is now confident that he will obtain the money he needs to invest and reorganize in 1984. Jacques Noels, manager of Thomson Semiconductors, alone, will need over 1 billion francs in 1984 to develop lines of discrete components, metal-oxide semiconductors, and radar linear, bipolar and special devices.

A "fan" of silicon, with a passion for electronics and for the group he is revolutionizing while cleverly relying on the support of its operational cadres, Alain Gomez will have to define a medium-range strategy, and probably sooner than he thinks (probably before the end of the year. With new men, which he will have to find before he promotes them, and even before the new structures are all broken in. "After shaking the tree to the point of unsettling its roots, you will see that he is going to decorate it!" a young engineer exulted. A difficult task: while Thomson is not far from Hugues (arms), it is far from being on the same level as Intel (components). But it is not as slow in catching up with Philips.

Thomson, Reduction of Central Departments, Increased Decentralization



The dual principle of reducing central departments and decentralizing operations is made clear by this very simplified flowchart of the new organization that should be adopted by the Thomson group.

9294
CSO: 3698/97

INTERNATIONAL CENTER FOR IC DESIGN CREATED IN PARIS

Paris ELECTRONIQUE ACTUALITES in French 21 Oct 83 p 27

[Article by FG: "In Paris: an International Center for Integrated-Circuit Design and Software Development"]

[Text] RTC [expansion unknown] has just created an International Applied Microelectronics Center, CIMA, designed to provide support for the European companies belonging to the electronics component division of the Philips group (RTC Microelectronics Division in France, Mullard in Great-Britain, Valvo in the FRG) in designing integrated circuits and developing microelectronics software, especially in the field of metal-oxide semiconductors.

The center was opened at Fontenay-aux-Roses, in the Paris area, on 1 October, and will eventually employ 25 to 30 people; it is not intended to replace national organizations (in particular, it is not a design center for prediffused devices, as such centers already exist, especially at RTC in Caen for bipolar devices, and in Paris for complementary metal-oxide semiconductors) but to provide support and technical assistance. All the same, it might have direct contacts with customers in certain cases, in countries where Philips does not have a components division (e.g. Switzerland, Italy).

In the field of prediffused devices, the CIMA's main task will be to develop new software to customize these devices.

Most of its activity will be aimed at innovating. Thus, it will have to establish specifications for future products specially designed to meet European users' requirements as expressed by national organizations. The CIMA's innovative activity will find a natural outlet in the design of very-large-scale integrated circuits aimed in turn at developing standard circuits that will eventually be manufactured by RTC, Mullard, Valvo or Philips (this activity will be oriented in particular toward metal-oxide semiconductors and the 68000 family).

The CIMA will also provide wide-ranging support to Philips's microprocessor operations. To do so, it will provide assistance in implementing and using microprocessors (especially the 68000 family) and their software, and will train specialized engineers in this field.

MICROELECTRONICS

SWISS FIRM IMPROVES METHOD FOR SOLDERING PRINTED CIRCUITS

Paris ELECTRONIQUE ACTUALITES in French 7 Oct 83 pp 1, 17

[Article by J. P. Feste: "Multilayer Circuits Operable Within 15 Days, Allowing for Delays: For Printed Circuits of High Density--Four-Track "Double-Face" Printed Circuits With 200 µm Between Holes"]

> [Text] From now on multilayer printed circuits with four to six layers can be replaced by one double-face circuit with metallized holes of equivalent density. The Swiss company ERCI represented by Sifrem has just set up for fabrication of printed circuits having 200-µm-wide tracks four of which can fit between the pins of the DIL case.

At the present time it is not possible to fit more than two or three tracks between the pins of the cases in a space of 2.54 mm, which reduces, allowing for holes and copper-coated areas, to less than 1.7 mm. In this case it is necessary that fabrication be particularly careful because the tracks then have a width of 160 µm.

The ERCI Company has found a way of increasing this density by eliminating the copper-coated areas of the metallized holes. These soldered points create a significant obstacle because of their own surface area and the resulting impediments to flow. Soldering still requires the presence of these copper-coated areas in certain cases. But the development of new automated soldering machines shows that for a good buildup of tin along the metallized holes these copper-coated areas can be used only if there is an increase in the wettability of the metals and the priming of the solder.

The company has therefore turned its attention to the problem of wettability and of solder priming. A method has been developed which is a sort of trick for determining the possibilities of the materials and of the equipment. This method consists in obtaining a reliable solder priming without soldering points on one side of the surface of the card bearing the printed circuit by using the phenomenon of capillarity; the metallization cylinder of the hole constitutes the catalyzing element of the capillarity of the solder.

No special equipment is called for but greater care is required in all phases of the production. The company asserts that cards thus manufactured can be tested with existing equipment even in the absence of soldering points.

Why replace the multilayers involving four to six layers with a double face having metallized holes of high density? The company replies and shows that the multilayer technique involves a laborious production technology which takes longer to put in operation. The density is limited depending upon the circuits by the electrical connections necessary between the different layers, connections having the form of metallized holes which are generally 0.6 mm in diameter and occupy much surface area.

Thus with the standard 0.8-mm holes spaced at 2.54 mm four 200-µm conducting tracks spaced accordingly can fit between the holes.

More Precision

On the other hand some precautions must be taken in drilling the holes. While sometimes a precision of .3 mm is sufficient, in the case in which one is drilling a hole without a soldering point it is imperative that the precision should be ±50 µm. This is the condition "sine qua non" for success of the method, according to the company. Because in a standard circuit a slight displacement of the drill hole has no effect on the electrical contact since the soldering point assures connection between the track itself if there should be a rupture in the circumference. But with this method the contact between the track and the metallized hole takes place only on the width of the track and the least detachment of copper can compromise this contact. The metallized cylinder of the hole near the insulator should be well tinned in order to constitute a good solder priming.

For the moment the best solution consists of hot tinning and blowing through the hole but research is in progress aimed at producing this tinning by an electrolytic procedure.

ERCI, a 12-person company having a capitalization of 1 million Swiss francs only produces double-faced printed circuits having metallized holes. Eighty-five percent of the production involves two to three tracks between the pins. It is negotiating the sale of licenses to use its procedure. The printed circuits are either of the serigraphic type or are produced by means of photosensitive resins. In serigraphy the company has manufactured circuits with 160-µm tracks; at the present time it even has at its disposal templates of circuits manufactured by means of photosensitive resins and having 100-µm tracks, thus increasing to eight the number of tracks between the pins of a DIL case.

It should be noted that according to the company, for an equal density, the price of a high-density double-face circuit is a third of that of the equivalent multilayer circuit.

The principal customers, around 80 percent, are manufacturers of information processing equipment.

8008
CSO: 3698/68

MICROELECTRONICS

SIEMENS HIGH-SPEED DMA CONTROLLER AVAILABLE BY YEAR'S END

Heidelberg ELEKTRONIK INDUSTRIE in German No 9, 1983 p 32

[Article: "DMA Controller Transfers 8 MByte per Second"]

[Text] ELECTRONIC INDUSTRIES readers know that important contributions to microelectronics and microcomputers also come out of Germany. For the fast DMA controller SAB 82258 announced in the special report "Advanced Electronics in Germany" (ELECTRONIC INDUSTRIES 11-1982) SAB 82258, Siemens has just finished the first chips for internal tests and qualification. The first issue of this chip (which will later be second-sourced by Intel) can be expected by users near year's end. The SAB 82258 is a microprogrammable 16-bit DMA controller with pipeline architecture.

The 48-mm^2 chip holds about 50,000 transistor functions, is produced by Siemens using MYMOS technology and is supplied in a 68-pin chip carrier. With a transfer rate of up to 8 Mbytes per sec in a single channel, the SAB 82258 offers 2 to 4 times the speed of current DMA circuits. In addition it can execute a set of commands independent of a main processor and is thus in a position to contribute directly to increased microcomputer performance.

It can combine scattered blocks of data into a single packet, for transmission for instance, or it can distribute parts of a data packet to different receivers. It offers several modes of operation such as the pairing of data with specific memory locations or the reorganization of bytes into words or the converse.

Although it is intended primarily for use with the 80286 microprocessor, it can, thanks to its adaptive bus interface, be used also in systems with the 8086/88 and 80186/188 processors.

9160
CSO: 3698/60

MICROELECTRONICS

INTEGRATED CIRCUITS, MBM'S, FORM FOCUS OF WORK AT FRENCH LETI

Paris ELECTRONIQUE ACTUALITES in French 30 Sep 83 p 13

[Text] As it does every year, LETI (Electronics and Data Processing Technology Laboratory) has just published the report of its activities for the past year, a report which discusses the laboratory's technologic orientations and the results obtained. We have extracted a few sections, most particularly concerned with electronic components.

In this sector which employs 260 people (a figure that should increase slightly in the near future), LETI's orientation for 1983-1987 remains nearly unchanged from what it was in 1981-1982. In the integrated circuits (IC) area, the programs are aimed at: basic techniques and machines; silicon IC; Josephson devices and IC; magnetic bubble memories (MBM); and infrared imaging IC. In I/O (input/output) components, the research is primarily concerned with: basic techniques; sensors; displays and flat screens; and guided optics.

In more general terms, during 1982 LETI increased its personnel by about 50 employees, a figure which had been stable at about 400 engineers and technicians since 1974 (this growth occurred as part of the electronics industry development, which has allowed LETI to enter into a period of slight growth in the coming years). Moreover, in July 1982, LETI became the national center for research and development in flat panel displays, which should expand ongoing studies (a program in this area has already been presented to the government). Also in 1982, construction began on a building specially adapted for microelectronics research, located at CENG (Grenoble Center for Nuclear Studies). This building, which will contain 1600 square-meters of clean rooms, should receive by the end of this year the research groups working on basic techniques in microelectronics, as well as on silicon, Josephson, and MBM devices. Lastly, aside from the components area, we should point out that in August 1982, LETI was the first in the world to show photographs obtained from the human body with a positron-emission tomograph using time-of-flight techniques.

0.7 Micron, 70 ps NMOS Ring Oscillator

LETI's silicon program is focused on the fabrication of submicron IC; the 1982 effort was aimed at the study of MOS components and the definition of technologic lines: NMOS with Thomson-Efcis, and CMOS with MHS. This effort succeeded in the fabrication of a ring oscillator with a 0.7 micron channel and with a propagation loss of 70 ps; the fabrication of MOS transistors with 0.16 micron-long channels, using electronic masking; and the development and mastery of a 1 micron-channel NMOS line.

LETI is also studying technology and design problems raised by the use of redundancy, with a view toward on-wafer integration.

Another orientation of the silicon effort is that of fast circuits, but it is not restricted to MOS alone, and the report states that "the combination of ongoing studies and research on the performance of ultra-miniaturized MOS devices, bipolar devices, Josephson circuits, and the structure of fast operators, should make it possible to better circumscribe the interests of the various techniques."

256 Kbit MBM in DNI Technology

In the MBM area, with the permalloy technology having been transferred to Sagem, LETI turned its efforts to DNI (unimplanted wafer) technology for the future generations of 4 Mbit per chip. A 256 Kbit memory with an 8-micron step has been fabricated in this way, and tested at a frequency of 100 kHz and in a temperature range of -10 to +80 degrees C. For this purpose, LETI has developed an entirely dry technology which uses vapor-deposited gold films for the propagation and conduction levels. The chip has a major-minor structure with bit-by-bit replication on major loops; minimal geometries fall between 2-3 microns. The current limiting factor is the duplication, and studies are underway to produce duplication gates which would allow the use of the structure in block replication, similar to that implanted in circuits currently on the market. The beginnings of a transfer of the DNI technology to Sagem also occurred in 1982.

National Center for Flat Panel Displays

Using the same DNI technology, LETI also fabricated and tested complete 4 micron-step circuits. The first results obtained indicate that these circuits can be designed by scaling down 8 micron-step circuits. By the end of this year, they should succeed in making fully operational 16 Kbit circuits, indicative of the behavior of an MBM of 4 Mbits on one square-centimeter.

During last year, the laboratory carried out an exploratory study of a conductive foil propagation tecnnique which makes it possible to cut off rotational fields (see ELECTRONIQUE ACTUALITES of 17 September 1982). As part of this study, LETI has developed and perfected a planar technology for MBM's, which was used to fabricate 2 Kbit conductive foil memories with an 8-micron step, composed of a sandwich of three levels of gold separated by 2000 angstroms of sputtered SiO2.

As part of the national plan for displays launched in 1982, LETI strengthened its electronic display potential, to conduct the following programs in technical research on flat screens: in the short and intermediate term, contribute to the launching of an industrial line of liquid crystals (BCE line) by Planetel (50 percent CGE and 50 percent CEA); preparation of subsequent generations of active-matrix screens to improve image quality and become capable of integrating all the control electronics in a low-consumption compact system; long range research on color, three-dimensions, large area. In this domain, as part of a collaboration with Sintra-Alcatel and with Planetel as prime contractor, a pilot line manufacturing operation was perfected for 10x15 centimeters BCE cells (250 lines x 320 columns).

Josephson IC Evaluation Programs

LETI, which remains the only European laboratory to conduct significant research on the Josephson effect, has decided on the basis of results that have already been obtained with these devices, to begin an evaluation program for Josephson IC. The goal of this program is to master superconducting material technologies, from tunnel junctions to the various stages for fabricating an integrated circuit. Part of its effort is also devoted to the simulation and design of logic circuits.

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BRITAIN'S PLESSEY RAISES 1982/1983 SEMICONDUCTOR REVENUE

Paris ELECTRONIQUE ACTUALITES in French 7 Oct 83 pp 1, 15

[Article by JP Della Mussia]

[Text] Swindon--It is still possible to make a profit from semiconductors in Europe. Several months ago, we had already pointed out the case of SGS (Societe Generale de Semiconducteurs), which for the first time this year will earn profits (or nearly) in this area. But Plessey Semiconductors has done even better, albeit on a different scale. After having overcome its losses during two years, the company has achieved "significant" profits in 82/83; these are not disclosed, but can be found in the revenues of its "microelectronics and components" activities which fall under the Plessey Semiconductors umbrella: this area has achieved revenues of 24.8 ML (million pounds) (300 MF) during the quarter ending on 1 July 1983, against 23 ML (276 MF, +8.6 percent) during the equivalent period of 1982, with profits moving from 2.1 ML (25 MF) to 2.6 ML (31 MF, +25 percent), essentially thanks to the growth of semiconductor sales.

These fine results are not due to an artificial recovery like France's, where stocks are being reconstituted to gird against a shortage which is becoming stronger every day. But they are very much the consequence of a natural recovery of the British market, which affects not only the sensitive large standard products, but also specific circuits such as those manufactured by Plessey.

Plessey Semiconductors' revenues in 82/83 were of the order of 300 MF. They will exceed 400 MF during the 83/84 fiscal year, with the company hoping to reach 170 ML (2000 MF) in 1988 with a steady past and future growth rate of 27 percent per year. Of these revenues, 50 percent are (and should continue to be) obtained from exportation, with the captive market, which is currently 13 percent, expected to grow during the coming years.

Market Product Niches

Company of niches: these three words provide a very good summary of the approach which a semiconductor company must use to achieve profits in Europe. Actually, the problem is not as simple as that.

Are these technology or product family niches? In fact, the only successful companies are those who have a stake in both. An original technology, the know-how for a 2 GHz frequency divider to use Plessey's example, brings requests from the communications sector and a knowledge of the problems of circuits involving these dividers. If the company has free initiative, it can then select an applications niche in which it can apply to conventional circuits, preferrably C-MOS, solutions to the non-technologic problems encountered by customers in the area under consideration. Even if the C-MOS technology being used is a conventional one, the final products that are developed will meet a need and find some success. This approach as a company of niches nevertheless requires a minimum investment: first of all in the advanced technology being applied; and then in a "support" technology which makes it possible to readily integrate the solutions into the peripheral problems that are encountered, with a gate array service fortunately completing this latter.

Historically, Plessey Semiconductors has not used this approach, but it did change its policy in time to satisfy the conditions for its present success.

As many companies of this type, it was first created to serve the needs of a broad group of customers, for which it used a large number of technologies: linear, MOS, C-MOS, ECL, CCD, MNOS, and so on. With all these technologies, it would have needed revenues of $1000 million to be profitable or specialized in all the possible and imaginable market niches. It therefore made a decision about three or four years ago: the company's goal is henceforth to make a profit before serving the group. All the technologies mentioned above and the corresponding products are still on the company's catalogs, but the essential investments are made only in certain priorities. In technologic terms, these priorities are ECL applied to dividers, and a C-MOS technology derived from Mitel's ISO-C-MOS. CCD technology could receive some investments if appropriate markets were to appear and form new niches.

120 C-MOS Gate Arrays Fabricated

We are convinced that the 2 GHz dividers made by Plessey do not meet a great market need today. On the other hand, the fact that the company does have this technology, brings Plessey in contact with all the innovations in this area, thus providing it with knowledge of all their circuit requirements. This technologic advance therefore allows it to carry out a better radiocommunications marketing, and succeed in this niche.

At the product level, Plessey is first of all seeking to reinforce its positions in C-MOS gate array and semi-custom circuits (perfectly adapted to a company of niches as a result of their delay/cost compromise for small runs), telecommunication circuits, and in radiocommunications and instrumentation circuits. Some consumer, industrial, and military circuits are also developed according to opportunities.

In a future issue, we will discuss Plessey's semi-custom circuits, together with the probable signing of an agreement with a French SSCM which undertake the design of circuits for the needs of the French market. We will

merely mention that in C-MOS, the company has a 5-micron/7 ns/14 MHz CLA 2000 family, and that it is currently introducing a 4-micron/5 ns/20 MHz CLA 3000 family (up to 4200 pads). In 1984, it will introduce 2.5-micron families operating at up to 40 MHz. The present gate arrays use two levels of metallization, auto-routing, and a software named Classic, which has a good worldwide record. In practice, a customer needs three days to be trained in Plessey's techniques in England; two days are then sufficient to design his own circuit (Plessey has already made 120 circuits with the CLA 2000 family).

Integrated Modem Before Two Months

In telecommunications, Plessey is currently supplying samples of an MV 3506 COFIDEC as second source, and within two months, should be in a position to supply samples of a highly anticipated modem, the XV 9001, which provides CCITTV23 spcifications (75/600/1200 baud, 1/2 duplex) on a single chip. This circuit combines digital C-MOS, linear C-MOS, and bipolar technologies, as well as a switched capacitor filter. In addition, Plessey is currently introducing the MV 8860/65 as second source for Siemens, and the SL 285 (for wireless telephone) as second source for SGS. Expected at the end of 1984, are the DTMF (dual-tone multifrequency) generators MV 5087/5089, and a SLIC (subscriber loop interface circuit) for which the British market alone offers a potential equipment demand of 3 million lines per year (one SLIC will cost on the order of 7 pounds).

Plessey Semiconductors is presently working hard on all intermediate digital circuits for telephone centrals, which will convert from 2 Mbits/s to 140 Mbits/s. In this domain, the telecommunication companies of the group are clearly the innovative ones; most of the time, the C-MOS semi-custom circuits are responding to their needs.

A 2.4 GHz Divider at the Show

In Communication/Instrumentation, Plessey will be in a position at the next Components Show, to offer samples of an SP8712 divider-by-four capable of operating at up to 2.4 GHz min. Plessey will then beat its own present world record of 1.8 GHz min (2 GHz typical). This is one typical example of a product can open up innovation. Radio, satellite, and various military transmissions could be interested.

In 1984, the implementation of a 2-micron oxide insulation technology will make it possible to reach cutoff frequencies of 10-12 GHz for transistors, which means a guaranteed operating frequency for dividers of more than 4 GHz. (The transistors of the 2.4 GHz divider have a cutoff frequency of 5.5 GHz). Dividers guaranteed at 4 GHz could thus be introduced in 1985. (Gallium arsenide products are not in Plessey Semiconductors' repertory, but do fall under the jurisdiction of the same umbrella company, Plessey Solid State; the subsidiaries of the latter are the Plessey Research Center, Plessey Semiconductors, Plessey Microwaves, Plessey Optoelectronics, and Plessey III V, with the latter being responsible for the development of GaAs circuits in conjunction with the research subsidiary).

Among the other circuits being introduced by the Communications Division are the NJ8821 frequency synthesizer, an adaptable version of the company's famous NJ8820.

Plessey is currently seeking to reduce consumptions and increase the range of its dividers. A 225 MHz/4 mA divider already exists; it will be followed by a 400 MHz/11 mA divider, and later by a 1 GHz/30 mA divider. To operate in conjunction with its own circuits NJ8820/21, Plessey is also developing 40/41, 64/65, and 80/81 dividers capable of operating at up to 1 GHz, which in principle will be available by next February.

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BRIEFS

NEW BRITISH SUPERCHIPS--Chips which are said to be 20 times as fast as present silicon chips have been developed by British researchers. The chips made from materials like indium aresenide and gallium antimonide are finding application in speech-input computers and in hyper-fast central computers which have to respond immediately to requests from connected home or office terminals. The chips were developed with the aid of a new piece of equipment which makes it possible to grow a composite semiconductor structure in the form of a super lattice. [Text] [Wuerzburg ELEKTROTECHNIK in German 7 Apr 83 p 5] 9160

'INTEGRATED CHIP DESIGN' PROJECT--An expansion of university research and training capacity in the field of microelectronic circuit design is being sought in the unified project "Design of Integrated Circuits" which is now being supported by the Federal Ministry for Research and Technology. Involved to date are 11 universities with about 25 teaching chairs and the Society for Mathematics and Data Processing, Bonn. Within 3 years (1 July 1983 through 30 June 1986), based on a large monetary and personnel investment, start-up aid for long-term activities in the universities will be offered. To meet the increasing demand for appropriately trained technical development personnel there have until now been only singular activities and an inadequate capacity for training in the design and testing of highly integrated circuits. To overcome these deficiencies, the unified project will feature a set of integrated design tools, and any existing gaps will be closed by new developments. The practical orientation of the project is revealed by the fact that functional chips will be manufactured. The Fraunhofer Institute for Solid-State Technology will be responsible for coordinating tests. [Text] [Duesseldorf VDI NACHRICHTEN in German 30 Sep 83 p 1] 9160

SIEMENS ENLARGES VILLACH PLANT--Siemens has just announced a new investment amounting to 300 million francs at the site of Villach in Austria for a unit to produce 1.5-µm printed circuits. We recall that Siemens has already been producing 2-µm MOS circuits on this site. The floor area of the clean room will thus increase from 4,400 to 20,000 square meters (dust-free operation in Class 10). Starting in 1985 the new unit should produce RAM 64 K and 256 K as well as advanced microprocessors and telecommunications VLSI. It appears that the cost of a 2-µm production line capable of putting out products from scratch is at the present time of the order of 160 to 200 million francs. By making today an investment in 1.5 µm Siemens therefore is in phase with the Japanese and the most advanced Americans when it comes to MOS technology. [Text] [Paris ELECTRONIQUE ACTUALITES in French 30 Sep 83 p 1] 8008

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DANISH INDUSTRY MINISTER FAVORS STATE-SUPPLIED RISK CAPITAL

Copenhagen BERLINGSKE TIDENDE in Danish 13 Oct 83 p 9

[Article by Dan Axél: "State Support for Product Development Is a Success"]

[Text] The government is banking a great deal on helping small and medium-size firms with risk capital when they develop new products. This will produce jobs and increase exports, while at the same time the entire sector is being modernized.

Although half of the projects which the Technology Administration grants State support to for the development of new products come to nothing, Industry Minister Ib Stetter thinks that the State support arrangement is a success. "There is still much benefit in the State's contributing risk capital on nearly equal terms with manufacturing firms which want to develop new products," Ib Stetter says to BERLINGSKE TIDENDE. "And at the same time we find that even unsuccessful projects are often successful in the respect that they produce experience for later use."

The Technology Administration reports in its annual report that the State in the years from 1978-80 has lost a good 200 million kroner by supporting projects which have not produced results--either in the form of new products or new sales. However, Ib Stetter thinks that the support arrangement for product development in spite of all "has shown very fine results."

"The supported projects can show a success percentage which other activities which actively participate in risk-encumbered development will regard with envy," Ib Stetter says. "The small and medium-size firms which receive State support for product development via technological institutes must themselves pay at least 60 percent of the expenses, so it is not without risk for them either."

Incidentally, the industry minister reports that with State support of only 66 million kroner new production and sales to the tune of 3.6 billion kroner--2.3 billion of this for exportation--were initiated.

Technological Development

"The government is banking, as mentioned in the prime minister's opening address, heavily on support of continuous technological development. Important areas are information technology, procurement of new foreign technology and investment in advanced research," Ib Stetter says.

The minister is aware that the development of these areas requires money. And that is not what there is most of for the time being. Anyway, Ib Stetter wants to set aside next year 315 million kroner for State support arrangements for technological advancement. This is a good 10 percent more than was set aside for 1983.

"We follow State-supported projects closely," Ib Stetter says. "And the support arrangements are also popular. There is great pressure; applicants stand in line to get a share of the risk capital which the State makes available. European studies of the manufacturing sector show that 40 to 50 percent of all firms are in danger of 'being overtaken by technology.' So therefore it is a question of using the present economic breathing space to carry out modernization," Ib Stetter concludes.

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FRENCH FUNDS, TRAINING FOR COMPUTER INTEGRATED MANUFACTURING

Paris AFP SCIENCES in French 6 Oct 83 pp 1-3

[Text] Paris--Three-Year Government Program to Develop Computer Integrated Manufacturing (CIM)

Industrial enterprises will be able to benefit from a number of financial aids to acquire new technologies, as part of a three-year CIM program decreed on 5 October by the Council of Ministers.

CIM is a keystone in the modernization of the French industry: it covers all the new technologies (data processing, electronics, and so on) which contribute to the design and implementation of automated means of production.

Thus, enterprises which will modernize and invest in CIM, will benefit from depreciation and financing assistance to acquire their first equipment. They will also have privileged access to the recently created Industrial Modernization Fund (FIM), which will distribute participatory loans at discounted rates. They will also be able to receive financing in conjunction with the training of personnel and with reductions in work hours. These projects will be essentially conducted at the regional level.

However, contrary to what was expected, the announcement from the Council of Ministers made no allusion to reductions in social costs for enterprises that acquire CIM equipment, even though the minister of industry and research, Laurent Fabius, had indicated on 15 September, during a visit to a CIM enterprise in the Paris region, that this provision was being studied.

The CIM Program

The announcement of the Council of Ministers indicates that the CIM program consists of four points.

I) Modernization of Manufacturing Industries

1) Enterprises which plan to modernize will be able to benefit from public aid for rapid or in-depth diagnoses; it will be possible to conduct 5000 diagnoses over the duration of the program.

2) Two hundred and fifty pilot projects will be launched in all the regions. These projects, which will closely associate user PMI (small and medium size enterprises) with CMI equipment manufacturers, will as examples, both in terms of procedures and in fundamental terms, handle the social problems involved in industrial modernization.

3) Enterprises which in concert with personnel representatives will undertake a significant modernization and investment program, as well as training and work organization efforts, will benefit from:

Special depreciation assistance;

Financing for acquiring their first equipment;

Access to loans from FIM;

And, failing that, financing associated with personnel training and with reduction in work hours.

In essence, these contracts will be drawn at the regional level.

II) Development of a French CIM Equipment Industry

The growth of CIM industries, whether for basic equipment (robots, manipulators, digital control) or for specialized equipment (machinery for textiles, food industry, and so on), will be encouraged by development contracts.

European cooperations will be sought in this domain.

III) Training

To successfully carry out the considerable effort for training and qualification needed for the next ten years, a first series of measures has been taken:

1) The minister of national education will implement by 1986, the necessary training for 300 advanced technicians and 200 engineers per year specialized in CIM, as well as 3000 technicians and 1500 engineers per year for the user industries;

2) An effort of comparable magnitude will be undertaken in terms of constant training, by the Ministry of Professional Training and the Ministry of Employment.

IV) Research

The effort of public research agencies, whose level, as the announcement points out, is internationally recognized today, will be increased. Particular support will be given to research in industrial enterprises, with 100 million francs of inducement credit being provided for this purpose in 1984.

The program thus defined should make it possible to:

Reverse the trend of the past ten years and start the modernization of our conventional industries, to create two million jobs;

Assure the progressive creation of a French industry competitive in automation techniques.

This program should thus make a major contribution to the economic solution to employment problems.

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FABIUS STATEMENTS ON FRENCH INDUSTRIAL POLICY

Industrial Plans, Priorities

Paris ELECTRONIQUE ACTUALITES in French 14 Oct 83 pp 1, 2

[Article by R. Vaillant: "Electronics, Government's Industrial Priority Number One]

[Text] Electronics is, for the government, priority number 1 in the industrial domain, according to a statement on 11 October by Mr Fabius, minister of industry and research, during a debate in the National Assembly on France's "industrial strategy."

The minister indicated that "the utmost effort" must be deployed to the benefit of electronics: "Nothing is more important than that," he stated, adding that the intent is to make France the world's third pole in electronics. The electronics high ground is "decisive" and a considerable effort must be made to attain it.

The use of the new technologies is one of the principal priorites of the government's industrial policy, the minister emphasized. Modernization is the main axis of France's industrial policy. "There is not a more important task to be accomplished between now and the end of the 20th century," Mr Fabius said. "We must modernize, or go into decline," he exclaimed.

Mr Fabius also stressed the necessity of European alliances: "Industrial fragmentation is a luxury that our nations cannot afford," he pointed out. "The building of an industrial and research edifice is one of France's best cards."

If France wants to remain the world's fifth industrial power--the minister also pointed out--it must put forth a considerable effort so as not to miss the opportunity in the "third industrial revolution," that has been spawned by technological changes.

An Extensive Technological Exposition in 1985

The minister also announced that an extensive exposition will be organized in 1985 on a national level, devoted to French scientific, industrial and technological accomplishments.

Mr Fabius also expressed his intention to "reinforce" Bull. Moreover, he advocated the development of a powerful durable goods industry--equipment for enterprises, but also for households--linked to the development of electrical power consumption over the next several years.

It is recalled here that this expansion of electrical power usage was recently decided by the governmen.

Speaking of nuclear-generated electricity, Mr Fabius stated that it is one of France's major assets and that our country is today the world's second-ranking in terms of nuclear power generation. France's assets must be utilized to the fullest, he said.

Mr Fabius indicated that another priority under the government's industrial policy would be the harnessing of energy, and energy savings. He also announced the forthcoming creation of a national commission for industry. In liaison with the Plan, this body will have as its function a yearly "follow-up" of actions undertaken in the industrial domain. It will be a tripartite commission: The state, employers and wage earners unions.

On the subject of the national enterprises assigned to his ministry, Mr Fabius stated they must be made into "a modern industrial tool." After indicating that the area of nationalizations would not be enlarged, the minister stated that these nationalized enterprises would be given wide-ranging independence of management and, on the other hand, be expected to achieve financial soundness by 1985. "The heads of the nationalized enterprises will be judged by their economic and social results," he emphasized.

With regard to the PMI [Small- and Medium-Size Industries] sector, Mr Fabius said he wants to "back the role of the PME[Small- and Medium-Size Businesses] to the fullest" and to see drawn up a "subcontracting charter." Proceedings relative to the PME--and in particular, their requests for financial assistance--will henceforth be processed exclusively at the regional and no longer have to be sent systematically up the line to Paris. Mr Fabius advocated the formulation of a code of conduct to be followed by the government vis-a-vis the PME.

With reference to training, Mr Fabius noted that France has a serious "under-training" problem. "There is an inadaptation gap between our needs and our training for them," he remarked. Consequently, an "exceptional" effort will have to be made in this domain.

The minister pointed out that electronics and data processing account for only 4 percent of the CAP's [Certificate(s) of Occupational Proficiency] and 2 percent of the BTS's [Certificate(s) of Higher Technical Competence] issued annually.

Resort to Protectionism Ruled Out

With respect to the CODEVI [Industrial Development Accounts], the minister stated that the initial results obtained through this new form of savings have been very favorable: It has been an "exceptional success," he said. It is recalled here that the CODEVI (see ELECTRONIQUE ACTUALITES of 9 September 1983) have been set up to feed the Industrial Modernization Fund, which in turn has been created fundamentally to promote the introduction of the new electronic technologies into businesses. Industrial investment must henceforth be given priority, Mr Fabius added. He stated that one-fifth of the sums collected by the CODEVI will remain in the regions.

The minister affirmed moreover that the government fully intends to not resort to protectionism and that, insofar as concerns his own ministry's policy, it has not the slightest intention of substituting itself for the industrialists. Mr Fabius intends to concern himself preferentially with the "industrial environment" and leave to the industrialists the greatest freedom of action. He also stated that freedom of industrial prices must be attained "rapidly."

With regard to the Nord Pas-de-Calais and Lorraine regions, the minister stated that: "They must receive the highest priority from the standpoints of industrial emplacements, technological development and research facilities." Lastly, he confirmed the opening, in 1984, of a "National Export School."

Modernization, Investment, Nationalization, Cooperation

Paris L'USINE NOUVELLE in French 13 Oct 83 pp 92-95

[Interview with Laurent Fabius, minister of industry and research, by Jacques Barraux: "Laurent Fabius: Another Viewpoint on Industry"]

[Text] "An absolute priority: Industry." After Pierre Dreyfus and Jean Pierre Chevenement, Laurent Fabius is trying hard to inject new substance into the socialist majority's slogan. Distrustful of sectoral policies, the minister of industry and research advocates a more "horizontal" approach to industrial policy. In an exclusive interview granted to L'USINE NOUVELLE, he outlined his views on the modernization of our productive apparatus, the financing of investments, training, nationalizations and his hopes for European cooperation.

[Question] You have made industrial modernization one of the high priorities of your intended course of action. Can you be more explicit? Will it be merely a matter of automating the plants? Do modernization and full employment not contradict each other?

[Answer] Industrial modernization is a major national priority. Over the past 10 years, despite some outstanding successes, our industry has fallen behind with respect to many competitors. The level of [illegible] investments, in terms of volume, was below that of 1974. The result: Aging of our installed machinery, productivity levels lower in some cases than elsewhere...

Of course, sectorially based actions have intervened here and there, but the new technologies are different from the older ones: They have an across the-board impact affecting all sectors and businesses of all sizes. They have a diffusive nature: Take electronics, or the biotechnologies, for example.

Industrial modernization requires a stepping up of research and training. It must be adequately financed. These are transversal actions. And the role of my department is first and foremost to enhance our industrial environment.

Modernization creates jobs; initially, it can also cost jobs. But without modernization, our industry as a whole is threatened. Automation could, in time, affect more than one-third of the workers in industry. All of this entails, therefore, a formidable effort of coordination and training.

In sum, modernization will mean restoring to industry its basic incentives, that is:

—Promoting the spirit of enterprise among the heads of businesses, in a world in evolution but in which the rules of the game must be clear and stable;

—Enabling businesses to set aside the funds needed for their development;

—Assisting each one to adapt to the technical factors of today, assisting them to prepare for and keep up with these changes that must be mastered.

[Question] The French industrial fabric consists in large part of a multitude of weakly structured PME [Small- and Medium-Size Businesses]. How is this handicap to be overcome?

[Answer] The weight and the role being borne by the PME in our industry are absolutely essential. The traditional constraints on the development of the PME fall under several headings: Problems of creation and of transference of businesses; financing difficulties; complexity of government regulations, relations with the administrative and economic environment; etc.

Now, in my view, it is the PME that are going to create most of the jobs in the years ahead. They are at the center of our industrial strategy. The development of the National Agency for the Creation of Businesses, the [illegible] first administrative procedural centers in each department, the elimination of direct taxes for incipient businesses, are all steps in the right direction, as are the measures designed to encourage savings and the second securities market.

We are going to follow up these improvements with the banking law, work on the drawing up of a subcontracting charter, the easing of taxes on the transference of businesses, the simplification of subsidization procedures and mechanisms, and the defining of a corporation law. The state must not intrude in the decision-making process of the industrialist. The aim, I repeat, is to create an industrial environment that favors development.

[Question] Is not the creation of a business enterprise a matter of money? How, in your view, is the industrial birth rate to be raised?

[Answer] A certain minimum capital is essential. That is why forms of financial backing--such as the regional grants for the creation of businesses--have been developed. In addition, the exemption from direct taxes, an exemption of 100 percent for the first 3 years, followed by a 50-percent exemption for the next 2 years--which has been granted by the central government, provides an attractive incentive for the young enterprise.

But the creation of business enterprises cannot be reduced entirely to a matter of money. One must first of all be willing to accept the responsibilities involved and be capable of carrying them out.

The cultural environment is important. It must help promote the spread of creation of enterprises. The recent development of "junior enterprises" in the universities, for example, is a positive factor. The same is true of the counseling committees, which can provide young creators with an effective backing. The consular bodies are also active. The National Agency for the Creation of Businesses is doing a good job.

The instituting of a leave of absence for the creation of a business enterprise should also open the way, in the big enterprises, for a certain number of industrial initiatives.

[Question] Like your predecessors, you seem dismayed by the strength of the anti-industrialist tradition. What must be done to change mindsets in this regard?

[Answer] "Reticence toward industry" is, first of all, historically attested. Certain sociological aspects, as well as educational ones, [illegible] a major role. In a survey that was made recently at my request, I learned that parents look forward to civil service positions as their best option for their children; the liberal professions follow in their natural ranking; and finally, a distant last: Industry. The image reserved for industry harks back, more often than not, to the 19th century. All of this cannot be changed by decree, but only by the convergent action of information, communication, a modification of relative remunerations, etc.

These are long and exacting tasks.

[Question] Why have "venture-capital" techniques never gained a serious foothold in France?

[Answer] The answer, in my view, is to be found in the relatively restricted size of our financial market and in the French mentality.

The French, unfortunately, have very little taste for "industrial risk." The hierarchy of tax incentives does not provide sufficient inducement under this aspect. The banking system itself has for a long time shown a "reticence" toward industry. This state of things, this mind-set, must be changed, by restoring to the French a taste for initiative and risk, and by the institution of incentives to the placement of capital in the productive sector.

The recent creation of a COdeVI [Industrial Development Account] to supply the Industrial Modernization Fund is a step in this direction. The same is true of the proliferation of innovation-financing companies and of the success of participative loans. The development of venture-capital investment pools is another component of this policy of reorienting the flow of savings in the direction of industry.

Other venture-capital investment incentives are under study.

[Question] Will the creation of the COdeVI be sufficient to induce a flow of [illegible] savings toward industry?

[Answer] The COdeVI is an important step. The modernization effort being undertaken requires considerable capital. True, the financial institutions are there to satisfy a portion of these needs, but they can only do this to the extent of their resources. Now, money often continues to be quite costly and the business enterprises must support the consequences, to the detriment of their profitability.

This cycle must be broken, particularly by making cheaper financing available to business. That is the purpose of the recent creation of the Industrial Modernization Fund. By 1983-1984, the Fund will have a minimum of 8 billion francs and will be able to finance modernization in some high-priority sectors, through participative loans at low interest rates.

This is important, but it is still not sufficient. It is imperative that, on the one hand, business enterprises be able to earn profits so as to be able to finance their investments by reinvestment (I am in favor of freedom of industrial prices), and, on the other hand, that they be in a position to seek private equity funding. This is a slow but vital evolution. It is beginning to shape up as of now, in that, within the last 9 months, the stock market has pulled over 10 billion francs from private funds into business enterprises, whereas until recently it had been unable to satisfy the demand beyond a level of 3 to 4 billion francs a year. The recent start-up of the second stock exchange is also going to play a useful role in this regard.

[Question] What are your expectations with regard to the joint government-employers commission formed recently to examine the problem of subsidies? Is a simplification of procedures seriously foreseeable? In what ways?

[Answer] Government subsidies to industry are too numerous and too complex. I doubt their real effectiveness, precisely because of their multiplicity. The PME enterprises, often poorly informed or not having access to adequate counseling, are actually often being deprived of subsidies.

It is a point on which I believe there is a vastly widespread consensus in France. Thus, we have decided to form this joint commission for the purpose of studying the problem in depth and coming up with concrete proposals. It has begun its work.

It is essential to simplify subsidies and to replace them, as and when it becomes possible to do so, with more cost-effective easing of financial charges. Based on the work that is already under way, I expect to be able to institute the necessary operational measures this coming year.

[Question] Are you one of those who feels that the state and its massive organizations divert an excessive number of the nation's elite away from industrial careers?

[Answer] Each year, roughly speaking, 15,000 youths graduate from the engineering, management and liberal professional institutes of higher learning, with equivalent diplomas. Not more than 10 percent of these graduates enter the public sector. That percentage does not seem excessive to me.

On the other hand, too few of these young people will be venturing on industrial creativity in the PME sector, preferring, instead the big enterprises. I would like to see the training in these schools contributing to the development of the industrial culture our country needs.

[Question] The top managers, the bankers and the top government officials in charge often have only a very mediocre technological background. How can this state of things be remedied?

[Answer] I can remember a time not so long ago when the complaint was the contrary: Too many top managers from the technical professions, and not enough true generalist managers!

We must therefore address the question with a proper degree of lighting and nuance.

A good grasp of today's problems requires a basic training in and an inquiring mind concerned with the technologies, which have not been among the priorities of our scholastic and university system heretofore.

All of that is beginning to change. In the creation of teaching positions, priority is now being accorded to the planning of technology. Professional experience is being taken more and more into account for access to the higher-level positions. My ministry is also carrying out an important role in the dissemination of technical information, to which it is devoting considerable sums. Obviously, this all requires time, but I am determined, because I consider the problems of training to be fundamental ones.

(Question) Is it not your feeling that, despite the progress being made in the teaching of management, the French enterprises have rather failed to assimilate the most recent management techniques?

(Answer) I would not be quite that severe. The French enterprises, generally speaking, are equipped with excellent management capable of assimilating and of putting the most modern methods into operation. There are French managers currently training at some large foreign groups and doing a very good job of it. But the situation is not uniform, and in some cases the management of some enterprises leaves much to be desired. And it is not solely a matter of technical background.

One of our weaknesses has to do with the relative disinterest too frequently being exercised in the marketing function. To use a turn of phrase, I might say--experimentally, of course--that we exalt design, practice production and denigrate the marketing. I exaggerate only slightly. In my view, this shortcoming is very detrimental. An all-out effort will be made to revalorize the marketing function.

It is not enough that we produce and that we produce well. We must sell. The overall health of our economy is at stake. The government has therefore decided to establish, in liaison with the existing entities, a National Center of Exportation, for the very pragmatic purpose of training the managers we now lack in this domain that is so vital to the future of the nation. In addition, training at all levels will be required to include this important aspect.

(Question) To avoid bankruptcy, a group like PSA (Peugeot-Citroën-Talbot) recently had to lower its sights, in 1981, to 2 million. Does this, in your view, signal the failure of Georges Pompidou's notion of an accelerated industrialization? What will replace it?

(Answer) The industrial perspectives of the 1970's, formulated for a period of dynamic and exceptional growth, were inscribed in extraordinarily long-range plans of ten and 15 years. The required changes did not always take place at the required time. If it were a matter of placing blame, I would not look to the direction of Georges Pompidou's presidency. I think he was very aware of the need for structural development. The big picture was more subsequently, in 1974, the product of the reaction to excessive investment on the part of the enterprises, which was a very shortsighted policy. Moreover, the world situation has often been insufficient.

I do not have a ready-to-wear "model" tucked away in my pocket. What we must seek is a new state of equilibrium. And for this, the country needs a credible industrial mobilization that will transcend the old structural groupings.

[Question] You are urging independence of management among the enterprises of the public sector. Would you impose on them a code of good management?

[Answer] Independence of management is indispensable. Simply because in a system characterized by flexibility and freedom, requiring the making of many-sided decisions, in a mercilessly competitive environment, the public enterprises cannot succeed otherwise. Of course, this independence of management will be exercised under planned-development contracts that define, jointly with the shareholder, the overall strategic choices as well as the principal objectives to be attained with respect to investment, research, social dialogue and relations with the PME, for example. That will be the code of good management.

[Question] Who will define the horizons of the nationalized groups: The state as shareholder or the top management of each group? For example: How should one interpret the "arrangement" signed between Georges Pebereau and Alain Gomez with regard to the electronics industries?

[Answer] The law provides that the enterprises must be given broad power of initiative. Of course, the state as shareholder is entitled to a say in regard to major operations, since the decisions involved must be compatible with the nation's overall industrial strategy.

The draft agreement between CGE [General Electric Company] and Thomson falls well within these terms of reference. The initiative came from the heads of these groups. It was analyzed in depth together with the shareholder, who laid down certain conditions, dealing in particular with employment, negotiability and effect of the agreement on personnel. That, in sum, is the framework. There is nothing mysterious about it.

[Question] Does this not entail a permanent risk of rampant growth of the public sector? Or of denationalization?

[Answer] Regardless of the evolution of the economic environment, the structures of industrial groups cannot remain frozen. An enterprise is a living body that needs to breathe, to grow, whether it is public or private.

It is a matter neither of authorizing some sort of rampant nationalization nor of eviscerating the decision of the lawmakers.

The rules of acquisition and cession will therefore be the subject of a bill to be submitted to Parliament, on "breathing space" in the public sector.

[Question] You are urging the launching of an industrial and scientific effort on a European scale. Why?

[Answer] The factual premise rests on several underlying figures:

-Eight of every 10 personal computers sold within the Community are imported from the United States;

-Nine of every 10 video tape recorders come from Japan;

-The penetration rate of robots is 55 percent, and that of components is 60 percent;

-European industry in the information technologies represents only 40 percent of the European market itself, and only 10 percent of the world market;

-As of now, 25 years since the Treaty of Rome, not a single European transnational group has been formed.

A European rebound is essential to the future economic development of the countries of the Community. Simply stated, in view of the new industrial revolution and of the international competitive situation, if this cooperation is not developed, the various countries of Europe, lacking as they do sufficient means and size, risk becoming second- and third-rate powers within a few years. We have just recently, in a memorandum titled "A New Mindstone for Europe: A Common Footing in Industry and Research," proposed to our partners a overall plan. It advocates six actions that are essential to pave the way for the advent of a more Community-based approach to research and industry.

[Question] Do you favor the idea of a certain degree of "European protectionism"? Do you consider it desirable to strengthen the protective mechanisms in certain sensitive markets?

[Answer] What France hopes is that joint commercial policy will not transform the Community into a watered down free exchange zone on the world economic map. While respecting the Community's international commitments, our joint commercial policy must be the instrument of our industrial development. Have spoken particularly to the troubled sectors requiring readjustments of necessity. But interim action is also possible at this time to spur the creation of industries of the future, such as those stemming from advanced technologies.

[Question] In Europe, industrial cooperation seems harder to develop than scientific cooperation. Can you cite some examples of new programs that would be encouraged?

[Answer] One could cite several examples of scientific cooperation in energy, like the Jet project on controlled thermonuclear fusion, and the Esprit program on information technologies. But it is true that we have not had, over the past 10 years, any new joint industrial programs like the ones we have known in the past, with Airbus and Ariane, for example.

Industrial cooperation is, first of all, the job of the enterprises.

Just recently, France has proposed to its partners to agree on a number of projects on which a European cooperation effort could be based: A tunnel under the English Channel, a European high-speed railway system, fiber optics communications links, interconnection of energy networks, data bank networks. The program is, to be sure, a conceptual one, the actualization of which must be governed by the interest it holds for the big European firms, but to which the governments can contribute by creating a favorable environment.

(Question) Will the French nationalized industries be asked to provide the examples?

(Answer) With regard to industrial cooperation, the French government hopes there will be room in the European industrial horizon for the development of different Community enterprises. The partitioning off of markets, the existence of sometimes divergent standardization policies, and the placing procedures and rules of competition peculiar to each country frequently compel the largest enterprises to seek agreements outside the Community.

It is essential, however, to develop the undertaking of joint ventures among European firms. It is clear, nevertheless, that the latter are free to make their own choices. The French government, in liaison with its Community partners, will apply itself to creating the best possible conditions for the development of such undertakings, for our nationalized as well as our private enterprises.

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SCIENTIFIC AND INDUSTRIAL POLICY

ERRATUM: This article is republished from JPRS 84672 of 2 November 1983 No 162 of this series pp 12-25 to correct certain chart headings and translation terms.

COMPETITIVENESS OF FRG HIGH TECH INDUSTRIES ON WORLD MARKET

Berlin IFO-SCHNELLDIENST in German No 17-18 1982 pp 48-57

[Article by Blau, H., Faust, K., Richter, S., Schedl, H.: "The Position of German Industry in Technology Competition on an International Level"]

[Excerpts] The success of an investment venture is decided not only by the attainable increase in productivity but also by the competitiveness of the enterprise in the particular production sector. This means that the engineering solution which was selected for the investment project must lead to internationally competitive products. The exact determination of the technological position of an enterprise or an entire branch compared to the most important competitors consequently is an essential aspect of the preparation of investment decisions. Analysis shows that this is possible only on the basis of detailed investigations.

Starting Points for the Determination of the Technological Competition Position

An analysis of German industry's technological position was prepared as part of the 1980 IFO [Economic Research Institute] structural report[1]; the data base extended only up to 1977 here. In the meantime, it has been possible to expand the data base up to 1980 for the 1983 structural report and considerably to enlarge that base also in some of the component fields. Research work has not yet been completed; the following report therefore is only a preliminary one.

Because the technological position is determined by the efficiency and the intensity of the national economic innovation process, we must above all consider the data relating to that process as indicators.[2] Here we are mostly interested in R&D expenditures as input factors and patent activities as a measure of R&D output. In looking at these data we must keep in mind a "time lag" of several years between the situation described and the particular technological competitive position regardless of the statements we can make on the basis of the type of determination and preparations. An analysis of foreign trade with high-tech products enables us to draw direct conclusions as to the technological competitive position.

Good Position in Trade with High-Tech Products

It is customary in this connection to measure the share of a defined selection of product groups out of the entire trade volume. The selection criterion usually is the expenditure for research and development in the particular branches. In the United States, for instance, investigations were published on this basis already in 1979 and the EC very recently included trade with high-tech products in comparisons of industry's international competitiveness.[3] As part of the structural reporting effort, the HWWA [expansion unknown] Institute of Economic Research in Hamburg[4] and the IFO Institute[5] examined the development of technology intensity in German foreign trade on the basis of an almost congruent product selection. Depending on the weight of the selected products in the total trade volume, the development of the technology intensive sector will also more or less strongly approach the development of the entire processing industry. In the following we will therefore only fall back on the product selection for technology-intensive products (including high-tech products) which was used by the IFO Institute in its structural reporting. As we can see in Table 1, the delivery share of the United States and the FRG out of the world trade volume with technology-intensive products is equal with a figure of 18 percent whereas the United States dominates with 33 percent in high-tech-intensive products. The relationship between high-tech products and the totality of technology-intensive products in the threshold countries is striking here because in this case--in contrast to the FRG and Japan--a higher delivery share is recorded here for high-tech products than for the totality of the technology-intensive products. This can be explained by saying that, in 1980, the threshold countries already delivered a large volume of structural components for electronics which were listed as high-tech products.[6] As regards the FRG, we must keep in mind that it in 1980 likewise holds second place after the United States in trade with technology-intensive products. Observers of technological development however again and again note rather critically that the industry of the FRG is rather considerably behind in the use of microelectronics as a base innovation. As part of the structural report, we therefore investigated the development of delivery shares for products where the use of microelectronics is significant. Table 2 shows the development for these products up to 1980--broken down by the inclusion of electronics in primary or secondary functions.

In analyzing the development of trade in the area of products with electronics main functions [high technology], it must be kept in mind that we are dealing here with two different product areas:

Products with a high-tech character, for example, data processing systems and electromedical instruments as well as

Products of mass-production character, for example, radios or watches.

It also turns out that the FRG was unable to achieve any export successes on any of these markets in recent years. It was above all the United States and the threshold countries in Southeast Asia that were able to expand their shares out of the world trade volume. The growth of American exports in recent years can be traced back above all to product areas with a high-tech character while the growth rates of the threshold countries were determined

mostly by mass production. The decline in the Japanese share between 1977 and 1980 was due to the decrease in delivery shares for mass-produced articles.

Table 1. Delivery Shares of Selected Countries for Technology-Intensive Products
Shares in %

Country	Technology-intensive products[a] A			Including "high-technology"[a] B			Average annual change rates in % A		B	
	1970	1977	1980	1970	1977	1980	1970-80	1977-80	1970-80	1977-80
FRG	20.6	20.3	18.1	8.3	10.2	9.7	- 1.3	- 3.8	1.6	- 1.7
USA	21.9	16.6	18.2	48.1	33.8	33.3	- 1.8	3.1	- 3.6	- 0.5
Japan	9.0	15.6	15.6	4.9	7.7	4.7	5.7	0	- 0.4	-15.2
S.E.Asian[b]	0.6	2.0	2.5	0.9	8.1	4.7	15.3	7.7	18.0	- 8.3

a) See IFO Institute of Economic Research, "Zwischenbericht zur Strukturberichterstattung 1979"

b) Hong Kong, Malaysia, the Phillipines, Singapore, South Korea, Taiwan. Source: OECD, Trade by commodities, Series C.

Table 2. Delivery Shares of Selected Countries for Products With Electronics Main Functions and Electronics Secondary Functions

		FRG	Japan	USA	S.E. Asian[a] threshold countries
		4 Elektronik-Hauptfunktionen			
Lieferanteil 1980	1	12.0	22.1	18.2	10.9
durchschnittliche jährliche Veränderungsrate 1970-80 in %	2	- 1.5	2.0	- 1.1	15.0
durchschnittliche jährliche Veränderungsrate 1977-80 in %	3	- 3.4	- 0.2	4.5	6.6
		5 Elektronik-Nebenfunktionen			
Lieferanteil 1980	1	21.4	21.3	13.9	0.4
durchschnittliche jährliche Veränderungsrate 1970-80 in %	2	- 0.9	9.2	- 2.6	23.1
durchschnittliche jährliche Veränderungsrate 1977-80 in %	3	- 0.5	5.6	- 4.2	17.0

Key: 1--1980 delivery share; 2—Average annual change rate for 1970-1980; in %; 3--Average annual change rate for 1977-1980, in %; 4--Electronics main functions; 5--Electronics secondary functions; (a) Southeast Asian Threshold Countries: Hong Kong, Malaysia, South Korea, Taiwan, the Philippines, Singapore. Source: OECD, Trade by commodities, Series C.

Growing Competitive Pressures From Japan and the Threshold Countries in Products With Electronics Secondary Functions

In the area of products with electronics secondary functions just because electronics has a secondary role doesn't mean they are mass-produced articles, the world trade shares of the FRG and Japan were almost equal in 1980. While the FRG revealed a declining trend during the 1970's, the share of Japanese suppliers definitely went up. United States exporters had to accept a bigger drop then the German exporters. They were the first to be hit by growing competitive pressure from Japan and the threshold countries.

The slight decline of the German delivery share in recent years for products where electronics play a secondary role does not express the fact that very heavy position losses materialized in some of the product groups that are important for German exports. The maintenance of the delivery shares in the auto sector had a stabilizing effect here on the whole. Particularly hard-hit were the machine-building areas under the heading of machine tools and machines for lifting and conveying. Delivery share losses of several percentage points developed in both areas. Extreme drops were also recorded in the typewriter sector; here the delivery share dropped from 28.3 percent in 1977 to 21.1 percent in 1980. A definite rise in the Japanese and American delivery shares was recorded in all of the three areas mentioned in recent years.

Position losses in the area of products where electronics play a secondary role are the more significant for German industry since a good 18 percent of all German exports were transacted in this area (only barely 5 percent of the exports were in the products where electronics play the main role. Looking at it overall we can also see that only a considerably smaller share of German exports consists of microelectronics-intensive products--that is, 23 percent--than in the case of Japan; there the figure was about 40 percent in 1980.

Patent Statistics: Difficult and Expensive but High Information Content

German industry's technological position in the field of microelectronics was studied as part of the 1980 structural report on the basis of patent statistics for 14 practical application areas. In the meantime the data base has been greatly expanded. About 70 percent of the data inventory of INPADOC, Vienna, which has in the meantime grown to 9 million documents, was used for this report; that data inventory has in the meantime grown to about 9 million documents. This signifies access to 3.2 million inventions which were applied for 2.6 million times abroad. As part of our investigation approach we are primarily interested in the number of foreign patent applications because that must be considered a criterion for the measurement of an invention's economic significance.[7] Out of the 760,000 foreign patent applications registered between 1976 and 1981, the FRG accounted for 156,000, the United States accounted for 239,000, and Japan accounted for 78,000.

Table 3. Shares of Selected Countries in Foreign Patent Applications and Out of OECD Trade in the Processing Industry, in %

1 Land	5 Anteile an den Auslandspatentanmeldungen 1976 - 1981 in ausgewählten Bereichen a) 7	6 Lieferanteile im verarbeitenden Gewerbe b) 1980
2 BR Deutschland	20.5	16.9
3 Frankreich	7.4	8.5
4 Großbritannien	9.1	8.6
USA	31.4	12.4
Japan	10.2	12.5

Key: 1--Country; 2--FRG; 3--France; 4--Great Britain; 5--Share out of foreign patent applications; 6--Delivery shares in processing industry (b), 1980; 7--In selected areas (a); (a) Excluding patent fields which contain exclusively armaments, essential foods, and others, about 70 percent of all patent applications during the period of time considered; (b) Excluding essential and nonessential foods. Source: INPADOC; OECD, Trade by commodities, Series C; calculations by IFO Institute.
Note: Applications filed for an invention with the European Patent Office were weighted with the factor of 6.5 in keeping with the average number of countries for which the desired patent protection is to apply. This is why "half" patent applications may come up in the tables.

No Generally Valid Tendencies in Evidence

The sectors selected in Table 4 for the determination of German industry's technological position took a share of 42.8 percent out of German exports in 1980. German industry's delivery share in these sectors is 18.6 percent, in other words, above that of the processing industry, while the share of German foreign patent applications roughly corresponds to that of the entire patent volume analyzed by us. By adding up the number of foreign patent applications for the selected foreign trade sectors, excluding double recordings of IPC symbols, we get a larger number than the total number of existing foreign patent applications because the inventions, as we said above, can be classified under several IPC symbols at the time the applications are filed with the various national patent offices. (One can use as many as 40 IPC symbols for describing an invention.) In our analysis we always considered all IPC symbols that were assigned because this gives us a hint as to the range of effectiveness of the individual inventions.

Table 4. German Industry's Technological Position Measured by Foreign Patent Applications in Important Foreign Trade Sectors Compared to Foreign Trade Shares

1 SITC-Nr.	2 Bereich	3 Auslandspatentanmeldungen in der Welt: 5 Veränd. insg. 1976-81 gegenüber 1972-75 (in %)	6 Anzahl insges. 1976-81	7 Anteil der BR Deutschland 1976-81 (in %)	8/9 Anteilsveränd. d. BR Deutschland 1976-81 gg. 1972-75 (in Prozentpunkten)	11 Hauptkonkurrenzländer	4 Außenhandel: 10 Anteile in % (19..): Lieferanteil der BR Deutschland	12 am Export der BR Deutschland	13 am Welthandel insges.
67	Eisen und Stahl	- 14	12 747,0	19,7	- [illegible]	[illegible]	17,[illegible]	[illegible]	[illegible]
14	Chemie								
[illegible]	Pharmazeut. Erzeugnisse	+ 6	66.619,0	16,3	- 1,9	US,GB,J	20,1	1,4	0,9
[illegible]	Waschmittel	- [illegible]	9.881,5	22,6	+ 5,7	US,B	[illegible]	[illegible]	[illegible]
[illegible]	Düngemittel	0	2.038,5	20,6	+ [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Insektizide, Herbizide etc.	+ 9	37.238,5	34,[illegible]	+ 1,6	[illegible]	[illegible]	[illegible]	[illegible]
15	Maschinenbau								
[illegible]	Kernreaktoren	+ 11	9.463,0	28,2	+ 2,2	US,F	14,6	0,[illegible]	[illegible]
[illegible]	Landwirtsch. Maschinen	+ 20	10.687,0	19,0	+ [illegible]	[illegible]	17,[illegible]	[illegible]	[illegible]
[illegible]	Bau-u. Bergbaumaschinen	- 13	8.983,5	16,3	- 0,3	US,F	15,6	0,5	0,[illegible]
[illegible] 44	Tiefbohrgeräte	+ 57	9 028,0	8,2	+ 1,6	US,F	3,0	0,0	0,[illegible]
[illegible]	Textilmaschinen a)	- 22	26.315,5	18,3	- 1,8	US,J,CH	[illegible]	1,[illegible]	[illegible]
[illegible]	Gewerbl. Maschinen u. Bearbeitungsmaschinen	- 24	28 105,0	32,1	+ 2,5	US,CH,GB	38,7	0,4	[illegible]
[illegible]	Papiermaschinen	+ 21	4.141,5	17,8	+ 0,2	US	25,3	[illegible]	[illegible]
726	Druckereimaschinen	- 24	8 971,5	28,7	+ 6,7	[illegible]	36,6	[illegible]	[illegible]
[illegible]	Kautschuk-u. Kunstst. Masch.	- 13	39.970,5	20,8	- 2,[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Werkzeugmaschinen	+ 2	36.649,[illegible]	[illegible]	+ [illegible]	US	26,[illegible]	[illegible]	[illegible]
[illegible]	Kälteerzeugung	+ 29	7.379,0	19,6	+ 3,1	US,F	9,7	[illegible]	[illegible]
[illegible]	Klimatechnik	- [illegible]	4.533,5	20,1	- 2,5	US,J	5,7	[illegible]	[illegible]
[illegible]	Pumpen u. Verdichter	- 3	10.955,5	22,7	+ 2,8	US,GB	21,6	[illegible]	[illegible]
[illegible] 2	Hebezeuge/Fördermittel	- 6	10.320,5	17,8	- 1,2	US,F	17,3	0,6	0,4
[illegible]	Verpackungsmaschinen	- 9	13.568,0	16,3	+ [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Waagen u. Feinwaagen	+ 5	2.512,0	23,2	+ 3,8	US,CH	35,3	0,[illegible]	0,[illegible]
[illegible]	Wälzlager	- 26	929,5	24,0	+ 5,2	US	26,[illegible]	[illegible]	[illegible]
16	Büromaschinen u. ADV								
[illegible]	Schreibmaschinen	+ 27	9.212,0	17,5	- 2,8	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	ADV	+ 18	50.54[illegible],0	12,8	- 0,7	US,[illegible]	[illegible]	[illegible]	[illegible]
17	Elektrotechnik								
[illegible]	Elektr. Kraftmaschinen	0	16 882,0	25,3	- 3,1	[illegible]	18,7	[illegible]	[illegible]
[illegible]	Fernsehgeräte	+ 2	13 76[illegible]	[illegible]	+ [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Rundfunkgeräte	- 2	6 [illegible]	17,[illegible]	+ [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Tonaufnahme-u. w.-Geräte	+ 9	21.285,5	13,0	+ [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Videorecorder	- [illegible]	4.231,0	7,3	+ 1,6	J,[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Drahtgebundene Fernmelde-u. Telegr. Technik	+ 23	[illegible]	[illegible]	+ [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Transformatoren	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Schaltgeräte	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1,6	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	+ 2,8	[illegible]	18,9	[illegible],6	[illegible]
[illegible]	Elektromedizin	+ 30	19.977,0	19,1	+ [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Haushaltsgeräte	+ [illegible]	[illegible]	[illegible]	+ [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Elektron. Mikroschaltkreise	+ [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible],4
[illegible]	Batterien u. Akkumulatoren	+ [illegible]	[illegible]	11,7	- 5,9	[illegible]	14,[illegible]	[illegible]	[illegible]
[illegible]	El. Meß-, Prüf-, Regelgeräte	+ 2	112.239,5	19,7	+ 0,9	[illegible]	17,6	[illegible]	[illegible]
[illegible]	Straßenfahrzeuge	+ [illegible]	[illegible]	[illegible]	+ [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Flugzeuge	+ 19	4 831,5	12,9	+ [illegible]	[illegible]	8,[illegible]	1,[illegible]	[illegible]
18	Feinmechanik, Optik								
[illegible]	Elektrostat. Fotokopiergeräte	[illegible]	[illegible]	[illegible]	+ [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Elektronenmikroskope	- 27	4[illegible]	[illegible]	+ [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Optische Meßgeräte	- 27	6[illegible],5	[illegible]	+ [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Fotograph. App. u. Zubehör	[illegible]	14 [illegible]	[illegible]	+ [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Uhren	- [illegible]	6.9[illegible],5	16,4	+ [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	Sonstige								
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0,7	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Schienenfahrzeuge	- 17	7.529,[illegible]	[illegible]	- 4,7	[illegible]	[illegible]	[illegible]	[illegible]
20	Summe der Bereiche	+ [illegible]	[illegible]	[illegible]	+ [illegible]		[illegible]	[illegible]	[illegible]

[Key on following page]

[See Table 4 on preceding page]

Key: 1--SITC No; 2--Sector; 3--Foreign patent applications worldwide; 4--Foreign Trade; 5--Change, overall, 1976-1981, as compared to 1972-1975 in %; 6--Total number 1976-1981; 7--FRG share, 1976-1981 in %; 8--1976-1981 FRG share change compared to 1972-1975 in percentage points; 9--Chief competitor countries; 10--Shares in 1980; 11--FRG delivery share; 12--Out of FRG exports; 13--Out of OECD trade, total; 14--Chemical industry; 15--Machine-building; 16--Office machines and ADV [general data processing?]; 17--Electrical engineering; 18--Precision mechanics, optics, watches; 19--Miscellaneous; 20--Sum of sectors; 67--Iron and steel; 54--Pharmaceutical products; 54.2--Detergents; 56--Fertilizer; 591--Insecticides, herbicides, etc.; 718.7--Nuclear reactors; 721--Agricultural machinery; 723.4--Construction and mining machines; 723.44--Deep-drilling equipment; 724--Textile machines (a); 724.7--Commercial washing and cleaning machines; 725--Paper machines; 726--Print shop machines; 728-42--Rubber and synthetics machines; 736--Machine tools; 741.4--Refrigeration; 741.5--Air conditioning; 742, 743--Pumps and condensers; 744.2--Hoisting gear, conveyors; 745.22--Packaging machines; 745.25 and 874.51--Scales and precision scales; 749.1--Roller bearings; 751.1--Typewriters; 752--ADV; 716--Electrical power machines; 761--Television sets; 762--Radios; 763.18 and 763.88--Tape recorders and [illegible] instruments; 763.81--Videorecorder; 764.1--Wire telephone and telegraph equipment; 771.1--Transformers; 772.1--Switching equipment; 773.1--Insulated wires; 774--Electromedicine; 775--Household appliances; 776.4--Electronic microcircuit equipment; 778.1--Batteries and storage batteries; 874--Electrical measurement, testing, and regulating instruments; 78--Road vehicles; 792--Aircraft; 751.82--Electrostatic photo copying equipment; 871.03--Electron microscopes; 871.04--Optical microscopes; 881--Cameras and accessories; 885--Watches; 65--Tires; 791--Rail vehicles; (a) Exluding 724.7 and 724.8; (b) Excluding foreign patent applications filed several times over (23, 105.5); CH--Switzerland. Source: INPADOC; OECD, Trade by commodities, Series C; calculations by IFO Institute.

The analysis based on foreign trade sectors shows that, in the various branches of machine-building, the delivery shares showed a rising tendency over the share of the FRG out of foreign patent applications while in the other sectors we can observe the opposite ratio. This leads us to assume that the inclination toward patent applications in machine-building is less--due to the size of the enterprises and the know-how advantages--than in the other selected sectors. One would have to investigate whether the lesser interests in patent protection abroad might not lead to market share losses in long-range terms.

Increases in the German share out of the foreign patent applications amounting to more than 2 percent were to be observed mostly in sectors where the total number of foreign patent applications declined worldwide. Exceptions here are the nuclear reactor, refrigeration, scales, household appliances, and aircraft sectors. This development can be explained by saying that--in fields with declining dynamics of technological development--highly-specialized enterprises with great know-how managed to utilize the residual existing innovation potential for themselves.

Apart from the videorecorder and electron microscope sectors--judging by foreign patent applications--the United States is German industry's most important technological competitor in all other sectors.

Looking at it overall, the selected foreign trade sectors reveal a rather divergent picture. We must however keep in mind that German industry also achieved foreign trade successes which are not based on an outstanding position in technological progress. To be able to draw conclusions for the individual sectors, we need a more detailed study of this development. In the following we will therefore discuss approaches to further investigations with the help of two examples--the machine-tool-building and vehicle-construction sectors. In this connection we have tables in the annex which illustrate the development of priorities and foreign patent applications between 1966 and 1981.

Detailed Investigations Necessary

In machine-tool-building, along with the industry as a whole, we first of all made a breakdown according to the type of processing (cutting or non-cutting) and we then selected for our study other important subdivisions because of their dynamic technological development. They include the following:

Systems for the control of feeder movements of tools or work pieces; this group thus encompasses an important part of automatic controls for machine tools;

Handling equipment and systems connected with conveyors for handling (moving) objects or bulk goods; this group offers an approach to the recording of technological developments essential for industrial robots;

Tool exchange systems;

[illegible] equipment;

Welding and cutting with lasers.

Looking at it as a whole, the analysis showed that the FRG was in second place behind the United States--and definitely ahead of Japan--in foreign patent applications for the average of 1976-1981 (see Figure 1 [not included]). It must however be kept in mind that Japanese industry was able to increase its share further while the German share stagnated. Looking at cutting and non-cutting machine tools, we can on the whole observe similar situations. In the area of cutting machine tools, the United States and Japan to be sure show higher shares than in the area of non-cutting machine tools which shrinks in terms of the number of patent applications.

In the technological developments which were selected by way of example and which are important for the productivity advances of the metal-working industry, a considerably higher growth of foreign patent applications was attained during the period of 1976-1981 as against 1972-1975 than for the average of the entire machine-tool-building industry (2.2 percent):

For high-performance lasers for metal-working	107.9%
For handling systems	27.3%
For tool exchange systems	52.9%
For chucking equipment	22.4%

In all four areas, the share of German patent applications went up even further so that one may assume that the German machine-tool industry decisively promotes development in these fields of technological progress.

But one must not overlook the fact that in this sector likewise less dynamic developments are to be observed. For example, looking at systems for controlling feeder movements, the share of Japanese foreign patent applications doubled toward the end of the 1970's, so that Japan takes first place here with 22.7 percent. The German share is in third place with 10.7 percent. This also reveals the already previously[10] observed weakness of German machine-building in the field of electronic controls. Strength in other subsectors is impaired by weakness in this field which is essential to the development of "smart" machine tools.

In the sector of motor vehicle engineering, along with the following subdivisions:

Combustion engines, their regulation and control,

Motor vehicle electrical systems and

Motor vehicle electronics,

We also selected the following sectors which are important in safety engineering:

Interval warning systems and

ABS [illegible],

As well as the following sectors because of the particularly dynamic development of foreign patent applications:

Regulation mechanisms for drive components (gears),

Waste-gas-powered pumps,

Safety, indication [dial], and surveillance systems, as well as

Electrical regulation of fuel injection.

Looking at motor vehicles as a whole and also in the subdivisions mentioned, the shares of German patent applications abroad increased. In most cases they

are only a little short of the American share (see Figure 2 [not included]). Looking at the dynamic sectors, we are struck, on the one hand, by the heavy loss of shares for regulating mechanisms for drive components (more than 5 percentage points) and, on the other hand, by the increase in German foreign patent applications for combustion engines and waste-gas-energy-d iven pumps (just about 7 percentage points). In all of these three search fields we can record a considerable increase in Japanese patent efforts. This does not apply to all fields. In the case of interval warning systems, German research and development is in the lead with 29 percent of all foreign patent applications, followed by the United States, France, and, way behind, Japan. In the field of regulation and control of combustion engines--which is very important for the technological development of the motor vehicle industry--we however observe a very great increase in the Japanese share of foreign patent applications; during the period covered by this report, it grew from 17.6 to 23.4 percent, while the German share only went up from 24.1 to 25.0 percent. In this field, German industry's position is still satisfactory. In the subgroup of electronic regulation for fuel injection on the other hand Japan is already in a leading position; its share rose from 9.8 to 29.2 percent whereas the German share dropped from 28.9 to 22.0 percent!

Great Increase in Research and Development Employees

If we compare the United States, Japan, and the FRG, then we can record the greatest increase in the number of persons employed in R&D in the FRG (Table 5); this applies not only to the entire period of time observed between 1967 and 1979 but also to the last 4 available years. A very great increase was observed during these last few years also in the United States. In absolute figures, the increase between 1975 and 1980 was 90,000 persons in the United States as compared to 50,000 in the FRG so that the United States was in a leading position here. If we look at the growth rates of persons employed in R&D in the Japanese processing industry, we are struck by the relatively uniform increase compared to the FRG and the United States. There was above all no reduction in the R&D personnel force. Looking at sector growth for persons employed in R&D, we find that we can record above-average increases in the vehicle-building sector in all three countries considered in recent years. The main emphasis in growth was to be found in the FRG in the machine-building sector (including office machines and data processing) whereas in Japan it was in the electrotechnical industry.

Table 5. Changes in R&D Employment Figures in Selected Sectors, %

1			67/69	69/71	71/73	73/75	75/77	77/79	67/79	75/79	5/6 Total Manpower 1979
										2	
3		Elektrotechnik									
	9	BR Deutschland	35.7	9.1	0.3	- 0.6	0.03	19.7	77.6	19.7	86 472
		Japan	35.5	10.9	12.0	3.9	3.5	12.1	102.9	16.1	83 567
		USA	2.0	12.7	4.2	- 3.0	4.1	9.3	5.8	13.9	92 800
4		Maschinenbau									
	9	BR Deutschland	16.6	24.3	0.1	7.2	12.5	41.2	246.7	58.9	38 954
		Japan	5.4	29.5	- 7.9	1.9	2.2	2.0	33.4	4.2	35 400
		USA	15.6	5.2	12.6	11.5	4.0	11.9	77.3	16.3	63 100
5		Straßenfahrzeugbau									
	9	BR Deutschland	49.9	20.2	-27.6	3.0	13.0	27.6	93.8	44.2	28 957
		Japan	45.9	21.4	23.6	18.5	4.6	13.7	181.9	8.4	38 942
		USA	-	-	-	- 7.6	14.6	15.1	-	31.9	33 900
6		Chemie									
	9	BR Deutschland	2.2	1.6	5.9	2.7	12.7	2.6	10.1	9.7	53 511
		Japan	15.5	6.7	- 4.8	4.7	0.8	4.8	27.8	4.0	62 450
		USA	5.7	4.5	1.2	8.3	5.1	- 6.8	32.7	12.3	50 300
7		Eisen und Stahl									
	9	BR Deutschland	- 8.2	30.6	- 18.5	12.4	- 6.9	25.8	46.7	17.1	3 861
		Japan	7.6	7.8	10.3	- 2.5	3.5	0.7	29.9	4.2	11 557
		USA	-	6.3	- 4.4	10.8	5.6	0	18.8	5.6	3 800
8		Verarbeitende Industrie									
	9	BR Deutschland	21.4	14.1	5.8	- 1.7	6.5	20.7	85.3	28.6	228 579
		Japan	16.9	10.8	8.0	5.8	0.9	8.8	59.4	7.8	313 515
		USA	3.5	7.2	0.2	1.5	8.2	11.5	12.8	20.6	420 900

Key: 1--Sector, country; 2--R&D; 3--Electrical engineering; 4--Machine-building; 5--Road vehicle-building; 6--Chemical industry; 7--Iron and steel; 8--Processing industry; 9--FRG. Source: OECD, R&D data bank.

Share of Scientists and Engineers Still Lagging

German industry's leading position in the increase of R&D employees is considerably relativized if one includes the development of the share of scientists and engineers in the study. As Table 6 shows us, this share was continually increased in Japan while an increase can be observed only until 1977 in the FRG; at the same time, the share was considerably smaller. Looking at the increase in the number of persons employed in R&D between 1977 and 1979, the share of scientists and engineers did not increase in the same way; it dropped by 2.4 percentage points in the entire processing industry. It is interesting to note that this above all involves machine-building and electrical engineering. One cannot rule out the possibility that scientists and engineers were available for R&D to a lesser degree than other employees.[11]

Table 6. Share of Scientists and Engineers among R&D Personnel, Total, in Selected Sectors, %

	1967		1971		1975		1977		1979	
	BRD	Japan	BRD	Japan	BRD	Japan	BRD	Japan	BRD	Japan
1	40.6	38.1	36.9	42.8	45.4	50.9	48.0	59.1	41.1	60.5
2	16.6	39.0	16.5	41.9	19.7	46.0	21.0	49.0	20.6	50.0
3	18.8	28.6	17.9	25.7	23.1	29.7	23.0	28.5	22.6	30.9
4	36.0	42.8	33.6	45.7	35.5	55.9	40.9	52.7	35.2	61.5
5	32.4	30.8	29.9	36.5	26.1	34.4	26.1	28.8	23.4	38.4
6	27.9	38.9	28.0	41.2	32.7	46.6	33.1	49.8	28.7	52.1

Key: 1--Electrical engineering; 2--Chemical industry; 3--Road vehicle-building; 4--Machine-building; 5--Iron and steel; 6--Processing industry; BRD--FRG; Source: OECD, R&D data bank.

Japan's sales successes on the world markets, which are greater when compared to those of the FRG, lead us to assume that qualitative viewpoints are more significant in an evaluation of R&D personnel than an increase in the personnel force as a whole. In this connection it is interesting to note that the French government's plans for the development of the research potential provide for training 4.5 percent more researchers and engineers annually and also to make corresponding jobs available.[12]

Declining Trend in Government R&D Promotion in Most Industrial Countries

In an earlier publication[13] we stated that in Japan, the financing of R&D expenditures in the economy sector in 1975 was provided to the extent of 98 percent by the economy itself while the corresponding share in the FRG was only 78.8 percent. As Table 7 shows, this trend toward government promotion was further strengthened in the FRG while the share of government-financed research in the economy sector declined in all other countries.[14]

Table 7. Economy Sector's R&D Expenditure Financing

Land 1		2 Anteil des Wirtschaftssektors an den FuE-Ausgaben insges. (in %)		3 davon finanziert durch: 4 Wirtschaft		5 Staat		6 Sonstige a)	
		1975	1979	1975	1979	1975	1979	1975	1979
BR Deutschland b)	7	66,4	72,3	78,8	79,4	17,9	18,3	3,3	2,4
Japan b)		64,3	65,3	98,0	98,5	1,7	1,4	0,3	0,2
USA		65,9	67,6	62,8	67,2	37,2	32,8	-	-
Frankreich	8	59,6	59,5	68,9	71,3	25,4	21,7	5,7	7,1
Großbritannien b)	9	62,7	66,2	62,8	62,8	30,9	29,3	6,3	8,0

Key: 1--Country; 2--Share of economy sectors out of R&D expenditures, total, %; 3--Including shares financied by the following; 4--Economy [private industry]; 5--Government; 6--Miscellaneous (a); 7--FRG (b); 8--France; 9--Great Britain (b); (a) Non-profit institutes and foreign countries; (b) Excluding the arts and social sciences. Source: OECD, R&D data bank.

FRG Still in Second Place after United States

As we can tell from the empirical analysis of trade in technology-intensive products, of patent activities, and of the number of persons employed in R&D on a global level, the FRG is still in second place behind the United States in technological competition. The analysis did not provide any hint to the effect that this standing might be threatened in medium-range terms even if we consider the differing time frame of the individual indicators. The FRG of course is also definitely behind Japan in the field of microelectronics application.

General statements about the technological position and the effect of technological efforts however always contain the danger that differing developments in important subsectors are simply equated. It follows from this also that technological efforts can yield immediate economic success only if they are made in a specifically target-oriented fashion on the basis of a detailed analysis of the technological competitive positions in the individual subject fields. The promotion of innovative efforts must--to the extent that it is supposed to go beyond measures for the promotion of the innovation climate--be preceded by such a detailed analysis. Otherwise one cannot rule out the possibility that one will also promote technologically successful suppliers. who are already saturating their market.

FOOTNOTES

1. See IFO Institute of Economic Research, "Analysis of the Structural Development of the German Economy (IFO Structural Report for 1980)," SCHRIFTENREIHE DES IFO INSTITUTS FUER WIRTSCHAFTSFORSCHUNG [Publication Series of the IFO Economic Research Institute], No 107, Berlin-Munich, 1981.

2. Konrad Faust, "Patent Data as Early Indicators of the Technological Position of Competing Industrial Countries," IFO-SCHNELLDIENST, No 27, 1981.

3. Commission of the European Communities, "The Competitiveness of European Community Industry," Document No 11/387/82.

4. HWWA, "Strukturbericht 1980," Material Vol 2, Foreign Trade Structure Data, Hamburg, 1981.

5. IFO Structural Report, "Zwischenbericht" [Interim Report], Munich, 1979.

6. Aircraft sales by developing countries in 1980 also resulted in shifts of shares in the high-tech product sector.

7. See IFO Economic Research Institute, "Analyse der strukturellen Entwicklung der deutschen Wirtschaft" [Analysis of the German Economy's Structural Development], Method Vol, Chapter 4, IFO Publication Series No 107/II, Berlin-Munich, 1981.

8. [Not included]

9. [Not included]

10. See "Analyse der strukturellen Entwicklung der deutschen Wirtschaft," pp 382 ff.

11. This also corresponds to an investigation by the IFO Institute according to which we can record a shortage in the supply of engineers for machine-building and vehicle-building as well as electrical engineers. See W. Friedrich, "Engineer Requirements in Industry and in the Main Construction Industry," IFO-SCHNELLDIENST, No 7-8, 1982.

12. Ministry of Research and Technology (Publisher), "Research and Technology," Paris, 1981; quoted from UMSCHAU 82 [Survey 1982], No 6.

13. H. Blau, K. Faust, H. Schedl, "Japan's Competitive Position in Industrial Commodity Export," IFO-SCHNELLDIENST, 28, 1981.

14. This trend to be sure was reversed in France due to the change in administration in 1980. See Ministry of Research and Technology, loc. cit.

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BRIEFS

'INNOVATION PARK' NEAR STRASBOURG--Strasbourg--Construction of the First Section of an Innovation Park Near Strasbourg. Strasbourg will soon have an innovation park intended to gather on an area of 200 hectares the most advanced scientific research units and high technology industries. The budget for the first 49-hectare section, whose cost is estimated at 62 million francs, has just been approved by the Council of the Strasbourg Urban Community (CUS). The total budget of the operation will amount to 100 million francs, "one of the largest economic budgets ever handled by the CUS," commented one of the councilmen. The park will be located at Illkirch-Graffenstaden, in Strasbourg's southern suburbs. The first construction will involve a 4000-square meters building designed to house high technology enterprises, and another 6000-square meters building which will contain a photonics center, a discipline with applications in laser technology. Designed with high environmental quality and green spaces, the innovation park will also include a recreation zone, and probably housing intended primarily for the industrialists and researchers who work there. [Text] [Paris AFP SCIENCES in French 6 Oct 83 pp 4-5] 11,023

FRENCH PATENT FOUNDATION FORMED--The French Patent Foundation has just been formed by the National Institute for Industrial Property (INPI) and the National Company for Patent Counseling (CNCBI). Intended to encourage the development and protection of French innovation, this foundation plans to gather together public and para-public agencies, professional organizations, and enterprises. ANVAR (National Agency for the Valorization of Research) will soon become a member of the foundation. The latter will award various prizes and grants to inventors or innovating companies, and in 1984 will organize a "French Patent National Day." During a press conference on 13 September in Paris, Messrs Combaldieu and Nony, director of INPI and president of CNCBI respectively, indicated that during 1982, the French have applied in FRG, the United States, and Japan for three times fewer patents than inventors in those countries have applied in France. Last year for instance, the Japanese made 4976 patent applications in France, compared to 1739 French applications in Japan. In 1982, the French made 10,681 patent applications in France, and the Japanese 191,300 applications in their own country. [Text] [Paris ELECTRONIQUE ACTUALITES in French 30 Sep 83 p 2] 11,023

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